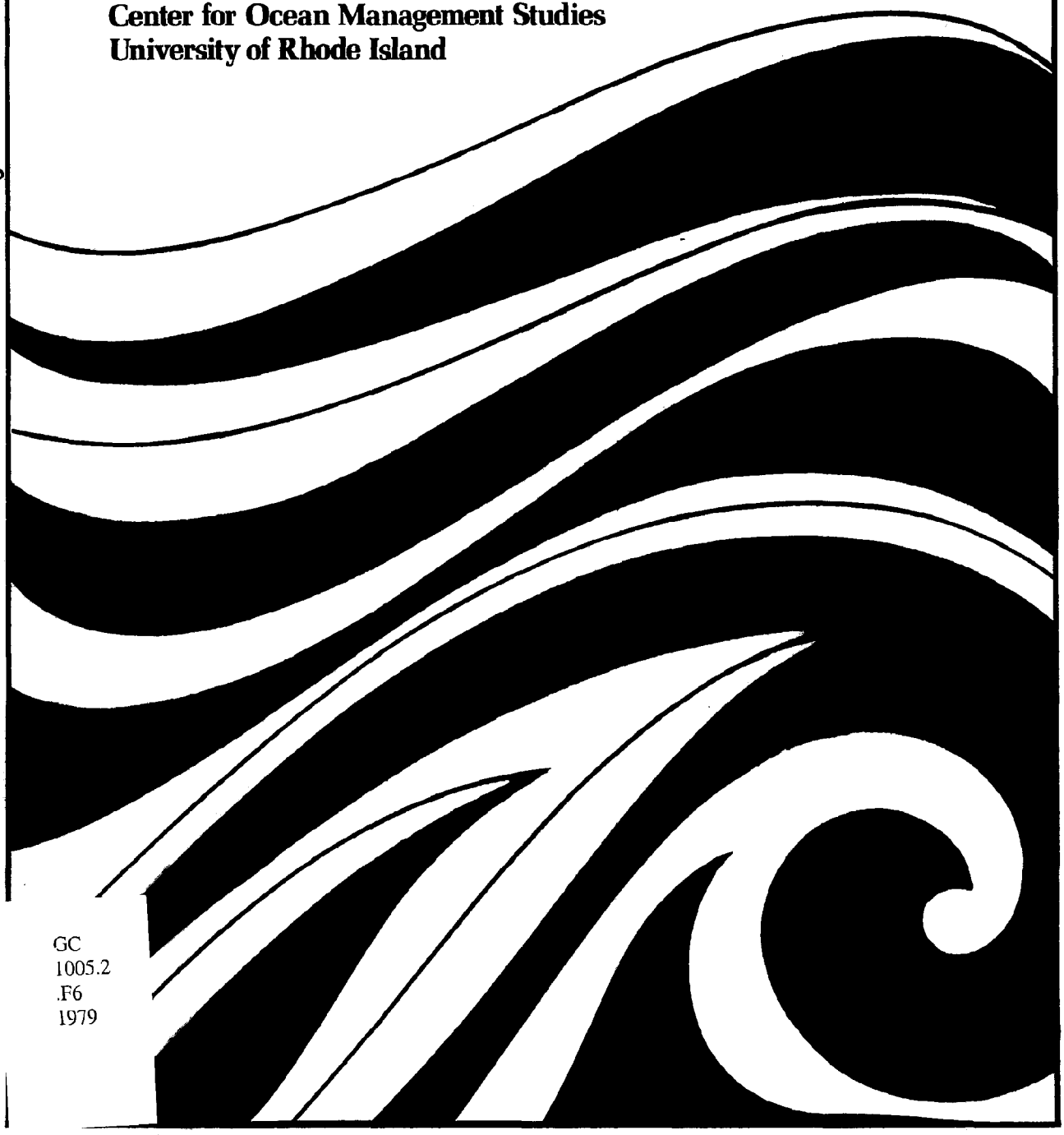
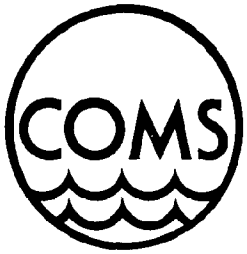
Formulating Marine Policy: Limitations to Rational Decision-Making

Center for Ocean Management Studies
University of Rhode Island





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The Center for Ocean Management Studies was created in the fall of 1976 for the purpose of promoting effective coastal and ocean management. The Center identifies ocean management issues, holds workshops and conferences to discuss these issues, and develops recommendations and research programs to resolve them.

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Preface

Virginia K. Tippie
Executive Director, Center for Management Studies

The formulation of marine policy is an exceedingly complex process, and its consequences often are not those intended by the policy-makers. In order to better understand this process, the Center for Ocean Management Studies sponsored a conference on formulating marine policy, which was held June 19-21, 1978. This volume reflects the discussions of the conference. In the opening session, several speakers discussed major policy decisions at the state, regional, and national levels. Subsequent sessions addressed the critical elements which constrain or limit the formation and execution of marine policy. These elements include jurisdictional complexity, information needs, and public opinion. In the concluding session of the conference, speakers addressed the decision-making process itself.

The Center for Ocean Management Studies was created in the fall of 1976 for the purpose of promoting effective coastal and ocean management. The Center identifies ocean management issues, sponsors workshops and conferences to discuss these issues, and develops recommendations and research programs to resolve them. It is our belief that in order to enhance our ability to manage the marine environment effectively, we must know how the decision-making process works. We feel that this document provides a valuable perspective on the formulation of marine policy and hope that it will assist policy-makers in recognizing the constraints on rational decision-making.

We would like to thank the many people who supported this effort. Timothy Hennessey, Political Science, URI, served as the conference chairman and provided the imaginative leadership that resulted in a very successful meeting. Members of the program committee who contributed ideas and served as session chairmen or participants include Francis Cameron, Geography and Marine Affairs; Peter Cornillon, Ocean Engineering; Walter Gray, Division of Marine Resources; Stephen Olsen, Coastal Resources Center; and Niels West, Geography and Marine Affairs. Special recognition must also be given to the staff of the Center, URI Conference Office, and URI Publications Office for their efforts in organizing the conference and preparing the proceedings. Also, a special thanks to the National Oceanic and Atmospheric Administration for making a very rational decision to fund the conference.

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Timothy M. Hennessey, *Chairman*

June 19-21, 1978
Center for Ocean Management Studies
University of Rhode Island
Kingston, Rhode Island 02881

Introduction

Timothy M. Hennessey
Professor of Political Science, University of Rhode Island

The purpose of this conference is to identify and analyze some of the basic problems associated with marine policy. Fundamental to this undertaking is a recognition that marine policy, like all public policy, is subject to significant limitations and constraints. We will be analyzing several of these in the course of the conference. It is important, however, to understand that such constraints are in no sense "artificial" or temporary. They are decidedly real, powerful, and can be ignored only at considerable cost to the public.

This view of a constrained policy-setting contrasts sharply with what we might call "the purist position." This is the view that the findings of a sound study or technical report should be incorporated directly into public policy in an almost mechanistic fashion. In order to understand this perspective, consider the researcher who has completed an important scientific study which clearly indicates that a particular course of action "ought" to be followed and therefore recommends this course of action to an appropriate public official. Since his recommendations follow from a set of technical findings in which he has a high degree of confidence, he may be shocked and dismayed to discover that they have been ignored or, even worse, distorted in the policy process. That is, the findings may ultimately appear in the policy but in a way that is virtually unrecognizable. Such an experience can be a source of frustration, perhaps even bitterness, and, more important, may lead to a subsequent decision on the researcher's part not to get involved in the policy process again.

It is difficult to estimate how many times this has happened to well-meaning, informed, and dedicated individuals, but my suspicion is that it occurs much more often than we are willing to admit. But insofar as this disillusionment does occur, and talented individuals with policy-relevant talents forego the opportunity to address themselves to significant public policy problems, a potential social cost is incurred if the policy is not as informed as it might otherwise be. Of course, one can never guarantee that individuals or even groups will not be disappointed when their recommendations are tempered, distorted, or even ignored in the policy process. As Aaron Wildavsky has characterized this phenomenon in a recent book, "speaking truth to power" is a risky business at best.[1] But the degree to which one is satisfied or disappointed by the results of one's involvement is in large part a function of the horizon of expectations one brings to the task. One of the goals of this conference is to help establish a more realistic level of expectations regarding policy formulation in the marine area.

The tempering of such expectations requires a body of theory and analytics which permit us to reason through the consequences of alternative policy recommendations in light of such limitations and constraints. This is an exceedingly large order, and several of the papers which follow contribute significantly to

meeting the challenge. Here I shall confine myself to highlighting some of the fundamental constraints which social scientists have identified as being present in any public policy process.

For purposes of argument, let us consider a simplification of the real world. We propose a model, following Bartlett,[2] which has basically four components or representative actors; namely, (1) elected officials, (2) bureaucracy, (3) producers, and (4) citizens. Obviously, these overlap in that individuals can be actors in more than one area. Nevertheless, let us consider what each group, taken separately, has as its primary objective. In Bartlett's model, elected officials seek to retain public office, bureaucrats seek security, producers seek profit, and citizens seek general social utility. *All of these actors labor under conditions of inadequate and imperfect information and limited resources* (i.e., time, money). Information is not costless; it must be acquired up to a point, but only insofar as it contributes to the strategic goals specified. It follows that actors will reduce their information costs by using strategic decision rules to identify decision-relevant information. Therefore, the relevance and salience of information for decision-makers is limited and explains why some information which is offered will be rejected even though it would seem essential to the problem at hand.

Under these conditions, the government, which is charged with making collective decisions, as Bartlett observes, exists "in a sea of vast uncertainty." It doesn't know for sure what it should do or, in fact, what it is doing in most cases. Where government ends up is largely dependent on how this uncertainty is reduced (i.e., upon who pushes hardest and in what direction).[3] Under these conditions, government behavior will tend to favor those groups which have the highest monetary or power incentive to influence the decision, and sufficient resources and organization to finance the production of such influence. In this model, citizen power will usually be less than producer power.[4]

But if each group behaves in this manner, what becomes of *the public interest*? The literature in political science and economics demonstrates that one cannot have a satisfactory definition of the public interest which stands apart from the process of political realization.[5] That is, the concept must be investigated in the context of groups realizing their objectives. This approach is clearly not what many observers have in mind. They seek a standard in terms of which recommendations can be made and existing policies judged. But how is one to know that one standard is to be preferred over another unless a reading of the preferences of many individuals and/or groups can be obtained? But if one does this, there will be an interaction among groups, and since preferences differ as to the intensities of such preferences, it is impossible to derive one overall, satisfactory preference. Indeed, Kenneth Arrow has demonstrated that under democratic conditions a satisfactory collective preference cannot be derived from diverse individual preferences.[6] Nevertheless, we know that the political process and the dynamic interaction of groups can produce policy with which "most people" can agree. The results may not be the hoped-for abstract ideal, but it may be the best the democratic process can produce. The public interest then cannot stand apart from such a process unless one could establish that the public preferred such an ideal. This, of course, requires a means for citizens to reveal their preferences. But this is accomplished through elections, referenda, or the action of representative bodies of one sort or another — that is, via the political process. Therefore, while standards of the public interest may be argued and perhaps imposed, the public interest is not a realistic or analytically satisfactory concept if it stands apart from the requirement of dynamic interaction among the groups previously specified.

It should also be apparent that the behavior of bureaucracies is central to our understanding of public policy. It was once thought that public bureaus behaved so as to maximize "the public interest." In recent

years, that assumption has been revised to bring it more in line with assumptions governing the behavior of other actors; namely, one of self-interest. Instead of bureaus maximizing the public interest, we view them as seeking their own best interest, which may or may not be consistent with what the public prefers. Anthony Downs, Gordon Tullock, William Niskanen, and others[7] all view the bureaus as maximizing security, the most important indicators of which are personnel and budget. One important, if not principal, measure of a bureau leader's performance, then, is the degree to which he obtains increases in both personnel and budget.

Such resource increases are not possible without a favorable relationship with Congress, the body which allocates the funds. In order to increase the probability that such resources will be forthcoming, the bureau chief must keep the preferences of important committees and committee members in mind in designing his program.

With respect to the Congress, we assume with Downs that politicians exchange policies for votes in order to obtain or retain elected office.[8] Therefore, we expect congressmen to scan program proposals with respect to their potential vote pay-off. For those policies which have a very low expected vote return, we expect low levels of congressional support or funding, leaving the potential for "log rolling" aside.

The Congress does not know or have the time to obtain information on all aspects of the bureau's operation and they are subject to influence by the strategic manipulation of information. In light of this, the bureau and its staff can be expected to package their programs so they are perceived in a favorable light by the relevant congressional committees. We can expect considerable competition among the various bureaus vis-a-vis Congress with respect to such funding.

A measure of public demand for the particular policy or policies can be ascertained in congressional hearings. There the bureau must enlist interest groups and concerned parties to express support for their particular program. These expressions of support are used by congressmen as "proxies" of public support for the proposed programs.

In short, the process of acquiring an adequate budget from Congress forces the bureau to enlist the public, or selected parts of the public, in support of its cause. Elected officials require such testimony so they can gauge the vote-getting potential of the proposed policy. The dynamics of the democratic process operate in this fashion owing to the limitations of information and the self-interest of the concerned parties. This policy process approximates what Charles Lindblom has called a system of mutual partisan adjustment, or "muddling through."[9]

This process has a frustrating tendency to reinforce the status quo.[10] This is so because the costs of influencing change are quite high. Those who currently control decisions have strong incentives to continue to do so, and the stock of information now in their hands vis-a-vis new information makes the costs of continuing on the present course less than inducing change. As Bartlett observes, "Agents attempting to alter the established pattern have less certain gains to expect and higher costs of influence, since they must overcome the effects of existing stocks of information and have to establish new contacts. Patterns once established are on firm ground, significant changes face many obstacles."[11]

This observation receives considerable empirical support in Aaron Wildavsky's research on the budgetary process.[12] He finds that federal budgets tend to proceed in an incremental manner. Wildavsky argues that the process proceeds by percentage increases in each policy area. There are few, if any, major reallocations of funds from one policy area to another. Obviously, such a strategy serves to reduce the information costs associated with understanding the details of each policy area and permits political returns to a number of elected officials. This incremental budgetary procedure may, however, prove to be another source of frustration for those who

take a purist-mechanistic view of the policy process. They might prefer to have a rank ordering of policies as they relate to "the public interest," with funding to follow accordingly. But such a procedure would violate the cost constraints and analytic problems outlined above. One suspects that the limited success of Planning, Programming, and Budgetary Systems (PPBS), as well as Zero-based Budgeting, may follow from the information requirements and political costs required of each.[13]

To this point, we have confined our discussion largely, although not entirely, to intragovernmental behavior. The policy process we have outlined increases enormously in complexity when we consider the intergovernmental interactions which are involved in formulating and implementing federal policy in the marine area. The Coastal Zone Management Act and the Fishery Conservation and Management Act require an understanding of multiple jurisdictions, since the states are designated as partners in the policy process. But multiple jurisdictions raise the problem of simultaneous, multiple, strategic behaviors. The analytic problems we have already outlined increase enormously in the multiple-jurisdictional setting. Given this difficulty, it is imperative that we have reference to conceptual tools which will enable us to reason through the consequences of such multi-jurisdictional arrangements. The work of Buchanan and Tullock, in their *Calculus of Consent*,[14] should prove particularly useful in this regard. They derive two costs in making institutional choices; namely, decision-making costs and deprivation costs. As you increase the number of individuals required to make a decision, you increase decision costs. Conversely, as you reduce the number of individuals required to make a decision, you increase the potential deprivation costs for individuals who are affected by the decision but not involved in the decision process.

In the two marine policy areas mentioned above, it is to be expected that the states will see the federal government as increasing deprivation costs for the states, while the federal government is expected to be sensitive to the decision-making costs associated with the joint decision-making with the states. Obviously, one seeks a design of institutional arrangements between these two types of costs.[15] Whether the current institutional arrangements in the marine policy area approach such a mix is addressed in the section of the proceedings dealing with "jurisdictional complexity."

Our objective in this brief introduction was to identify some of the constraints which are present in the policy process. We have included in our discussion the public — or, more properly, interested publics — the role of information, jurisdictional complexity, and the policy process itself. Some of these sectors will receive detailed treatment in the sections which follow. We also noted the important interrelationships which exist between elected officials, the bureaucracy, economic producers, and interested publics. We observed that decision-makers require information, that the information acquisition process is costly, and the information obtained is necessarily incomplete and imperfect. These conditions permit — indeed, encourage — strategic behavior to influence policy formulation and implementation. Each of the actors in our model has a strong incentive to see the course of such policy go in the direction he or she prefers. Out of this process of mutual partisan adjustment, or "muddling through," in Lindblom's terms, public policy is made and carried out.

For those who have a purist-mechanistic view of public policy our discussion will prove unsatisfactory and irritating. They may seek the "optimum" marine policy. They may wish to use utility theory and statistical decision theory to construct a logical framework for rational choice among given alternatives and then use the existing body of techniques for actually deducing which of the available alternatives is the optimum. But as those familiar with this approach know full well, only in trivial cases is the computation of the optimum alternative an easy matter.

The approach to finding alternatives which comes closest to recognizing the constraints we have noted might be called a satisfying model of public policy.[16] This is a concept used by Herbert Simon to move beyond optimization computational techniques to deal with bounded rationality or constrained choice as it yields satisfactory performance. He refers to "figures of merit," which permit comparison between designs in terms of better or worse but seldom provide a judgment of best. As he points out, no one in his right mind will satisfice if he can equally well optimize: no one will settle for good or better if he can get best. But this is not the way the problems present themselves in the public arena. As Simon notes, "An earmark of all these situations where we satisfice for inability to optimize is that, although the set of available alternatives is 'given' in an abstract sense, it is not given in the only sense that is practically relevant. We cannot, within practicable computational limits, generate all the admissable alternatives and compare their respective merits. Nor can we recognize the best alternative, even if we were fortunate to generate it early, until we have seen them all. *We satisfice by looking for alternatives in such a way that we can generally find an acceptable one after only moderate search.*"[17]

The policy process we have outlined has the advantage of generating a number of policy alternatives originating from diverse sources. One suspects, therefore, that a satisfying or "good enough" model of public policy might be the closest approximation to the conditions and interactions we have identified. If we use a satisficing model of marine policy, we can recognize the limitations within which strategic behavior has its largest return for the time invested. We can also begin to be more efficient and more effectively involved in the policy process and, at the same time, minimize disappointment with policy formulation and implementation.

Notes

1. Aaron Wildavsky, *Speaking Truth to Power* (Boston: Little-Brown, 1978).
2. Randall Bartlett, *Economic Foundations of Political Power* (New York: Free Press, 1973).
3. *Ibid.*, p. 76.
4. *Ibid.*, p. 77.
5. See Carl J. Friedrich, *The Public Interest* (New York: Atherton, 1962).
6. Kenneth Arrow, *Social Choice and Individual Values* (New York: Wiley, 1961).
7. Anthony Downs, *Inside Bureaucracy* (Boston: Little-Brown, 1967); Gordon Tullock, *The Politics of Bureaucracy* (Washington Public Affairs Press, 1965); William Niskanen, *Bureaucracy and Representative Government* (Chicago: Aldine, 1971).
8. Anthony Downs, *An Economic Theory of Democracy* (New York: Harper & Row, 1958).
9. Charles Lindblom, "The Science of Muddling Through," *Public Administration Review*, vol. 19 (Spring 1959).
10. See Timothy M. Hennessey and Spencer Wellhofer, "Toward a Theory of Marginal Change in Bureaucracies," paper prepared for delivery at the annual meeting of the American Political Science Association, Washington, D.C., 1977.
11. Bartlett, *op. cit.*, p. 88.
12. Aaron Wildavsky, *The Politics of the Budgetary Process* (Boston: Little-Brown, 1964).
13. See Allen Shick, "A Death in the Bureaucracy: The Demise of Federal P.P.B., *Public Administration Review* (March/April 1973).
14. James Buchanan and Gordon Tullock, *The Calculus of Consent* (Ann Arbor: University of Michigan Press, 1962).
15. The analytics necessary to begin to determine the appropriate administrative arrangements are discussed in Vincent Ostrom and Eleanor Ostrom, "Public Choice: A Different Approach to Public Administration," *Public Administration Review* (March/April 1971).
16. Herbert Simon, *The Sciences of the Artificial* (Boston: M.I.T. Press, 1969), pp. 62-64.
17. *Ibid.*, p. 65.

Opening Address

Claiborne Pell
United States Senator from Rhode Island

I would like to congratulate John Knauss, Timothy Hennessey and Virginia Tippie on setting up this conference. Time does go by quickly. I recall what got me started in marine affairs. I remember coming by the University one Saturday, a very rainy Saturday with my then very small son, and about the only person working down in the fish laboratory was John Knauss, whom I had not met before that time. He very nicely took us around and showed us the laboratory and gave me a feeling for what the potential was at the University of Rhode Island. Out of that came a good friendship, and many projects that we worked on together for — I think and I know — the benefit of the nation, and I also think the benefit of URI. I look forward very much indeed to continuing this partnership.

I remember when we started out in 1968 working on Law of the Sea questions, which I called an "ocean space treaty." That was the best name I could think of. I was working in the Senate on that concept at the same time that Alfred Pardo was making his demarche in the United Nations. I remember holding a hearing at the time, and the witnesses in the government came up and said, "That's an utterly ridiculous idea, a treaty for ocean space. It's inconceivable." This was during the Johnson Administration. It's a strange thing — I don't know if those of you who are from Washington would agree with me — but it strikes me that I still see the same faces there before me — I've been there 18 years now — coming up to Congress, wearing different hats, and all the time I've been saying very much the same things.

When you look at it from the perspective that I do, it is kind of startling. A man who opposed the idea of an ocean space treaty when we started out is now the head of the Arms Control and Disarmament Agency, and I think his ideas have changed a great deal there. He has to reflect different policies, depending upon who the boss is. But you get sort of skeptical. You wish you would see people who would just say the same thing and wear the same hat maybe, or say the same thing through the years, whichever hat they are wearing.

At any rate, the Law of the Sea is moving along. I don't think it's going all that slowly. I was talking to John Knauss just before the meeting. When you think that people have been sailing the oceans for thousands of years and "x" part of the oceans for hundreds of years, the fact that we've come as far as we have in ten years is not too bad, and the thought that we should always try to achieve success in the next meeting is one of the reasons why maybe sometimes we haven't achieved success in the next meeting. I believe we can afford to be patient. I think we've moved a long way toward the Law of the Sea treaty, and I think eventually we will find that the treaty will come forward. I think it's particularly appropriate that this conference take place right here in Rhode Island, because we are, as you may have noticed on the license plates, the "Ocean State." In fact, that idea I think came from a talk

I gave in Jamestown, also in the late sixties. We used to have a license plate saying, "Discover Rhode Island," which always burned up, I'm sure, most of my fellow citizens. I suggested that Rhode Island be called the "ocean state," and the idea caught on in the state legislature. Looking out on the ocean, we really do think of ourselves as the "ocean state."

Rhode Islanders know also that our state's ocean location and marine resources have a great deal to do with the future of our state, because we know that the way we use and manage our coastal areas and the decisions that are made on the use of ocean resources are very important to us. For this reason, because we know it's important, our state has been in the forefront of coastal zone planning and management.

I'd like to touch on this question of how policies are formed. I must say that I agree with the thought that reason does not always control decisions. I think we try to do this with the oceans and areas that we can apply scientific knowledge to, but when you come down to it, whether as a nation or as individuals, the really important decisions are usually not made on the basis of reason; they're made on the basis of emotion. The question of whether a nation goes to war, the question of how a nation really handles its big problems are seldom made rationally: they're made emotionally. And that applies to personal lives too. The question of whom you marry is an important decision. That's not always based on reason, it's based on emotion.

I think we ought to recognize too how the oceans affect all of our people, the number of our people who live near the oceans. You heard, earlier, Lew Alexander talking about how the coastal belt has all the problems of the 200-mile economic zone out from the shoreline. But we also have another belt — which one might call the ocean belt — reaching 200 miles inland from the shoreline, the most economically important part of our nation.

Here in Rhode Island, we know that virtually every major national ocean policy issue has a direct bearing on our lives and on the future of our state, our environment, and our economy. Let me give you a couple of examples. The offshore oil development: we're a prime site now for shore support facilities for Atlantic offshore oil and gas development. This region has a prospect of having a major job-producing industry based on natural resources. It's impossible to overemphasize how important a good welcome to this industry is to a state like ours, that's been short of jobs, short of energy, and, except for fish, devoid of major natural resources. Federal offshore leasing policies are not an abstraction to Rhode Islanders, but of critical and major concern. And that's why those of us in government were so upset at the violence that developed the other day when the workers moved on to the Davisville Base. I know, in my case, I called up, sent telegrams to various labor unions and the big oil unions, the big oil companies, and spoke to Mr. Meany and a couple of the oil chief executive officers, because I found Rhode Island being used a little bit like a battlefield by the efforts of big labor to try to organize big oil, and if they succeed in chasing the oil companies out of here, and into Massachusetts and New Jersey, big labor will pursue them there and probably will continue on that battlefield. My hope is that they would lay off so that we could get the industry established here. It's of acute concern to our state.

The second major issue is fisheries policy. The adoption of the 200-mile fisheries zone was a major national policy achievement which is already having a profound impact on our own Rhode Island fishing industry. For the first time in decades, there's a lively interest in new investment in fishing and fish-processing facilities, and Rhode Island fishermen are participating directly in the management of the coastal fishery resources. The 200-mile limit, the need for an early resolution of the boundary dispute with Canada, and for the imposition of the countervailing duties on Canadian fish, are not remote theoretical questions, but matters of direct impact on people's lives and livelihoods.

We see here also how reason does not

always control, because we have different criteria for our positions in different international conferences and different versions of the same problem. For example, when it comes to the boundary dispute with Canada, parts of it we want to have settled according to what we call "special circumstances," while in other parts of the United States we think it should be settled according to the "median line theory." It just depends on where you are, and what your national interest is at the time, which is perfectly understandable, and that's what lawyers are for and conferences are for, and why you always have to have this little bit of give and take. But the list of problems that concern our state is nearly endless. Coastal sitings of power plants and ocean refineries aren't just national policy questions but, again, problems of immediate interest to Rhode Islanders who are interested in power and energy supplies as well as the preservation of our environment, and yet frustrated at the cost of heat and the cost of energy. We have the problem of a great nuclear reactor, not too many miles to the west of us. Should we go ahead with it? Shouldn't we go ahead with it? If we don't go ahead with it, where will we get the energy?

Ocean aspects of national defense policy are a strategic and tactical matter, but they also have a direct impact on the use of Narragansett Bay for home porting, for submarine construction, and for naval research, and those activities make a big difference to the citizens of this state. From a geographic viewpoint, this harbor, Narragansett Bay, is really the closest major American harbor to Europe, to the North Atlantic. For direct sailings, the so-called "great circle route." And if you take a plane from Washington to Europe, one hour later, if the weather's good, you can look down and see this building we're in, if your eyes are that good. We pass directly over it. On the other hand, if you want to go the other way, you get down to Norfolk, where they moved the fleet a few years ago.

I think my point by now is clear, an effective national ocean policy and effective organization of federal ocean programs are virtually important, not just to our state, but to our nation. They are important not to satisfy political science theory, not to satisfy bureaucratic craving for nice, tidy "table of organization" charts, not because of romantic attachments to the beauty, the power, the vastness, and the mystery of the oceans. They are important because effective national ocean policy and effective program organization affect individual Americans, be they in California, Louisiana, or right here in Rhode Island. So I hope you will keep in mind the perspective that this is the "ocean state," that we are ocean-oriented. If you want to take the reverse of the coastal belt, rather the ocean belt inland, that really is where the population of the United States is concentrated, where the great educational institutions are, generally speaking, situated. The policies we make for the interface between the land mass and the ocean and for the exploitation of those resources are going to have a direct effect on us for a long time to come. So I welcome you all here, and I deeply regret that I can't be with John Knauss, and share your conference for the next couple of days, but I look forward to hearing the results. I wish you well, and hope you like Rhode Island so much you come and settle down here. Thank you.

Formulating Marine Policy: Past Experiences

James P. Walsh
Deputy Administrator, National Oceanic and Atmospheric Administration

Good morning. I guess I was selected to be the keynote speaker this morning because the theme of the conference is "Limitations to Rational Decision-Making." The basic thrust of the conference, as stated in the conference brochure, starts from the premise that public decisions are irrational because they are made in the context of jurisdictional complexity, public opinion, and lack of adequate information. On that basis, I stand before you as the truly irrational man, a person who has worked in government for most of his working life, a lawyer, a person who has spent many hours concerned about politics and about trying to make the system work, hopefully, a little better.

By the way, I work for the National Oceanic and Atmospheric Administration. After eight years, people still don't get the name right. My mother-in-law still thinks I work for JONAH, an organization to preserve whales based in San Francisco.

I do appreciate the opportunity to give the keynote address this morning. I've always been impressed by the University of Rhode Island, although I have strong attachments to the University of Washington. John Knauss and Lew Alexander are two of the more preeminent people in the field now referred to as marine affairs or ocean policy, and they have always been in the forefront. It is particularly gratifying to see the changes here at URI, whether for rational or irrational reasons, from the Law of the Sea Institute to a program that focuses on questions of domestic policy-making. It has been said that John and his colleagues in the marine science community are concerned about freedom of science because they enjoy working off foreign shores a lot more than they do working off U.S. shores, but I'm sure John will deny that. The creation of the Center for Ocean Management Studies is certainly an indication that that is not true.

Questioning whether reason or rationality enters into decision-making in marine affairs is surely an attempt to foster a debate at the conference. I was immediately torn about how I should approach this opening speech, whether I should give a series of anecdotes, like saying that the reason the Coastal Energy Impact Program was created was the fear of the Commerce Committee that the Interior Committee would get jurisdiction over coastal zone management. But I won't tell you that.

Perhaps I could talk about how fisheries management in this country really began with an irrational desire to get rid of them darn foreigners who were stealing all our fish, or about how the same information we used to get rid of the foreigners is the same information that our fishermen now use to say there are more fish out there than we ever knew. I could also, as I am tempted to with this theme, pull out some of my college books on political philosophy. The discussions of Plato about the philosopher king, and of Aristotle about the relative benefits between a state aristocracy and a common decision-making process, and the

merits and demerits of each, seem relevant to our theme. We could review the litany of the various political philosophers, and review what the United States government is doing in light of the preferred system. But I won't do that either.

One point I did want to make at the outset is that we have to understand where ocean policy stands in terms of the "bigger policy-making picture." I look at people who are interested in ocean policy and marine affairs as interested for irrational reasons. That is to say, they simply *like* the subject matter. But marine affairs does not occupy a high level in the view of our nation's leaders and public policy-makers, or even of the public generally. Look about this room. If we were having a conference on Proposition 13 today, I suspect we would fill this room. But it is not filled. Ocean policy, we say, is a comprehensive, integrated pattern of decisions made in one sector that affects the decisions by others, all occurring in the context of the oceans. We say we need a comprehensive ocean policy. But that is an idea which is not subscribed to or written about by very many people. Others believe that we now have an adequate ocean policy, that we don't need a "comprehensive" ocean policy. Ocean policy decisions are in fact made each and every day — they are made by special interest groups; by various levels of government, state, local, federal, or international — and we ought not to have anything called a Statement of Comprehensive Ocean Policy, because it doesn't really add anything.

Many people feel that if we have an energy policy question that affects, say, the coast, it should be decided in the context of energy policy; or if we have a question of fisheries, we ought to make it in the context of fisheries policy. I have noticed, since joining the National Oceanic and Atmospheric Administration, that this kind of view tends to draw the organization apart. In some parts of the country, elements of NOAA simply do not speak to one another, even though in many cases they operate under a mandate to coordinate and cooperate in establishing common programs. Much of that, of course, is due to historical development and much is due to the fact that they simply don't feel that there is any need for interaction.

I would, having said all that, conclude nonetheless that it does make sense to try and develop a comprehensive ocean policy. Let me say why. We are at an interesting juncture in what we refer to as ocean policy. Ocean policy is approaching maturity and is of considerable importance to the public. Ocean policy issues have reached a level in our society where they are dealt with in the normal government decision-making process. Ocean policy decisions actually are not new. They began with questions about how we should spend research funds to learn more about the ocean, particularly its sound-carrying properties and its basic characteristics. And those questions grew out of one of those irrational needs, the need to know something more about war-making in the oceans. In the beginning, ocean policy was largely confined to scientific questions and issues. The basic policy decisions made by the government were decisions related to how much money was spent for this kind of research, this research vessel, or that kind of research or vessel.

Beginning in the 1960s — because more and more people began to do more things in the ocean — the situation changed. Greater control to prevent interference with other uses became necessary. We wanted to make sure that what people did in the ocean was rational. Ocean policy developed into what I call the fully matured period — the era of management, regulation, jurisdiction, and government involvement.

At this point, we must discuss the philosophy of government and problem-solving generally. Is it a good idea, for example, that there be so many lawyers working for NOAA? I know that even Phillip Handler commented on my appointment as an indication of the sad state of affairs in the science community. I can tell you that I don't spend much time on science questions, and much of the agency doesn't spend much time on science questions, because we're working full time dealing with some unbeliev-

able public policy decisions (e.g., fishery matters), the application of laws, and administration of programs. We have come to the point where NOAA is doing what many other government institutions do; that is, regulate certain activities. We are trying to carry out Congress' legislative intent. For example, in fisheries, Congress said we need fishery management. Before that, fishermen came to the Congress and wanted simply to get rid of foreign fishermen. Congressmen with particular political pressures in their districts or their states, because of fishermen, said that that was a good idea. But other politicians didn't have that same kind of political interest. So the only way the legislation could pass — although many fishermen will not acknowledge it — was to have the law create a management system to protect fish stocks. It was shown that certain fish stocks around the United States were in danger of extinction, commercial extinction, and that much of the cause was the foreign fishing effort. But Congress also knew that overfishing was due to domestic fishermen; for example, in the Pacific halibut and the salmon fisheries. Establishing a national fishery policy meant assuring good management. You just can't kick the foreigners out and expect the stocks to flourish.

On the floor of the Senate and the House (more the Senate than the House because the opposition was stronger there) the basic element that carried the day was a rational concept: the need to require management of the fish stocks in the 200-mile zone. Legislation that lacked a management program would not have passed the Senate. The "foreign policy" opposition was simply too strong. But the case for management in an expanded fishery zone was made on a factual basis, showing that fish stocks were declining. Because of this, middle-of-the-road senators from the middle of the country voted in favor of the bill and it passed.

During the height of the debate, the tuna industry was reaching for an argument that would swing support to their side. I have to compliment George Steele, a lobbyist for the tuna industry, because he conceived a rather novel argument for his clients. They focused on soybean farmers in the Midwest and said that if the 200-mile limit bill passes no tuna will be caught off South America, and if no tuna is caught off South America the soybean farmers won't sell soybean oil for canning US.-caught tuna. Well, that scared the daylights out of a couple of congressmen and eventually cost some votes in Illinois and a number of other places. But, again, reason rose to the forefront and this argument eventually failed.

So Congress, in passing the 200-mile legislation, identified the real problem: overfishing by everyone, not just by foreign fishermen. I think the outcome was defensibly rational.

We in the ocean policy community are getting too inbred. We forget that we are part of an overall policy-making apparatus, a broader system of government which influences greatly the decisions that we would like made. I guarantee you that Proposition 13 will do something to ocean policy. The appropriations committees in the House and the Senate are worried, and they are beginning to cut budgets. You know, the oceans community has strong friends on key congressional committees. We hope to keep them just as friendly as we can. But we are already suffering cuts, and other agencies will suffer cuts, but that doesn't mean the process is irrational. In many instances of public policy, we do not have a choice between reason and unreason, or rationality and irrationality. Our government faces choices among subjective, often conflicting values, and making those choices is the proper realm for what we call politics. Most people in this country don't believe it's important to have an ice-strengthened research vessel. Now, some of you in this room will say that position is absolutely irrational, that we have to know more about the Arctic and Antarctica. And many of you in this room will probably say that we don't need a welfare system because that's irrational. But if you're poor and you're hungry, and you have no means of support other than the government, you think it's completely rational that there should be a welfare program.

The system that we have created tries to

make these choices, and sometimes does make these choices on an irrational basis. For example, it has been suggested that NOAA's location in the Department of Commerce rather than in the Department of Interior was a result of pique on the part of President Nixon: Secretary of Interior Hickel had offered some unsolicited advice on Vietnam from his children and was in disfavor at the time. At the same time, I'm not totally convinced that the other organization choices would have been any more rational. NOAA could have been an independent agency, but would it function any better? It's tough to find good standards on which to evaluate that kind of thing. Policy often comes down to a choice between values, and we shouldn't forget that.

As I said earlier, the espoused theme of this conference is to evaluate the limits of rationality in ocean policy. I submit that rationality can lead to irrationality, and that irrationality can even lead to rationality. Let me give you an example of the latter. Federal marine mammal legislation was generated by people who felt an affinity for Flipper. Because people felt this emotional attachment for Flipper, they wrote to their congressmen and senators — in large numbers — and said that if the legislation didn't pass they would vote against them. Many seemed to care very little about any other issue, but hundreds of thousands of letters came in about Flipper. Any congressman or senator who wanted to be reelected decided that he too liked Flipper. So, for emotional reasons, the Marine Mammal Protection Act became law. It mandated that the killing of porpoises during fishing operations must be reduced to a level approaching zero. At that time, there was no evidence, no scientific evidence, to conclude that such a level could in fact be achieved by the tuna industry. Yet it was mandated.

While the story isn't over yet, something very interesting has happened. Last year there was another confrontation between the porpoise people and the tuna people. The tuna industry had made some success. They had reduced their incidental kill of porpoises from about 400,000 animals in the late 60s to about 57,000 animals a year ago. But a court decision said that the National Oceanic and Atmospheric Administration was being too nice to the tuna industry. The court said the porpoises came first under the law. The tuna industry went bananas, came to Congress and asked that the law be changed. To some extent, environmentalists sympathized. But the emotion over Flipper getting killed remained very strong. The hearings before the Senate Commerce Committee were a really fascinating vignette in human relations. We had a big fight over who would be first on the hearing list. The tuna industry presented a group of cannery workers from San Diego, mostly women, several of whom couldn't speak English very well, who thought they were going to lose their jobs; a couple of them came to tears. They followed representatives from the environmental community and one of them began to cry as she described baby porpoises being killed in the nets and eaten by sharks. The two sides glared at each other the entire time. The environmentalists were angry because the tuna industry had put on the cannery workers and the tuna people were angry because the environmentalists seemed more concerned about animals than people.

Well, what happened is that Flipper won the skirmish. Although a bill was written to relax the quotas, further heavy restrictions were placed on the tuna industry. The industry took a look at the bill, refused to support it, and went out fishing. With the development of something called the "superapron" and the new "backdown" procedure, the tuna industry then became very successful at releasing porpoises: over 99 percent of those caught in their nets were released, and the fleet sets on about 6 million porpoises a year when it's a heavy "on-porpoise" fishing year. Irrationality started this process — the love of Flipper — and emotionalism created public policy to protect Flipper. The goal of the act is now close to being achieved. The industry has reduced considerably the kill of porpoises through practice, pressure to do the job, and a little help from technology. I believe the result is rational. The

tuna industry now operates in a manner that is not totally destructive of the animals they use to catch fish. But it is hard to believe, in a process like that, that you're headed in a rational direction.

I had an interesting experience recently over an issue called "joint ventures." "Joint ventures" is an inappropriate term, but it relates to whether foreign processing vessels can be licensed to accept fish caught by U.S. fishermen within our 200-mile fishery zone. To me, it is an example of the process at its worst. It also points out many of the weaknesses of our decision-making process. And it points out that many people think that public policy should reflect only their special interests. In addition, this recent experience convinced me that the process doesn't work very well unless there is strong advocacy of all contrasting points of view.

On the one hand, we dealt with the fish-processing industry, an industry able to hire expensive lawyers to represent them in Washington, and to hire lawyers to represent them anywhere in the country full time. On the other hand, we dealt with fishermen who are poor at organizing and who do not have the money to hire full-time advocates to deal with the system, a system which is admittedly complex. And into the process was mixed a little extra emotionalism, an ability to read politicians and political concerns, and enough rhetoric to preclude a quiet, careful decision-making process.

The process first began with a series of hearings held by the National Marine Fisheries Service. Of course, the views that came through loud and clear, and most often, were of those who had a special financial interest in the outcome, primarily the fish processors. This shows one of the real weaknesses of advocacy government. Public comments are requested, considered, and a decision is made. But a full display of views is not always argued before the decision-maker, often only those of the special interests.

When we came to the decision point on this issue, NOAA had not done an in-depth legal analysis of our authority. After we did the analysis it became clear that, while the legislation is vague and perhaps an argument can be made, clear regulatory authority to restrict the sale of fish by U.S. fishermen was lacking. We recommended that Congress address the issue and declined to regulate our fishermen.

When I worked for Congress, senators and congressmen were upset about executive agencies broadly interpreting their authority. So I thought it was good that NOAA concluded that it shouldn't make legislative policy. Well, the "blank" hit the fan. This issue became a case of political football.

It wasn't until a court in Seattle, Washington — not more than two weeks ago — agreed with our position that the legislation did not cover this subject, and agreed that it probably would be better for Congress to deal with the issue than have the Executive regulate it, that the issue became less heated. Up until that time our organization was heaped with abuse. We were accused of vacillating and many other things. A lot of people were even saying that they would just as soon have a decision even if it was wrong.

But you have to wonder about a system that operates in that manner. Too many people want you to do it their way, regardless of merit. Unless you are willing to take unusual abuse, it is very tough to be a government decision-maker.

Despite all this, I have found Washington to be a rather exciting place to work. I hope that out of the activities of this Center more people will come who are willing to say, Yes, the government is bad, and we want it off our backs, but let's make it work a little better. One of my own personal concerns about ocean policy is that during the time that I've been in Washington I've seen a great reluctance on the part of many people in the ocean community to get involved in the decision-making process.

Once I was sitting on the floor of the Senate with a person who was doing an internship with Senator Hubert Humphrey, and we were dealing with a sports bill. I began to talk to this gentleman, who, as it turned out, was a political scientist, an intern with something called the

American Political Science Association. He told me that his colleagues in the political science field, and other academic acquaintances, felt that he had completely sold out by coming to work for the Congress. I was a little bit shocked by that. It seems to me that if you're really going to understand something, you not only have to look at it in the laboratory, but you should march right out there in the middle of the bay and find out if your laboratory conclusions work in application. I was somewhat chagrined to find that the basic attitude of his colleagues in political science was that to work for the government is to sell out.

I would hope that after you evaluate the limitations to rational decision-making, you will not conclude that government is a hopeless case. I think there's a great tendency to do so today, not only in the more popular areas of public policy-making but in the oceans area as well. Certainly, limitations exist, but I believe, having spent much of my time working with the government, that people willing to make commitments to a rational decision-making process, although they don't succeed each and every time, are much needed.

To try and understand the way the government works through this conference or through political science textbooks published today would be a real mistake. If there's any way that people here can get involved in the process, to take the risk of a government job and try and help make the process work better, they ought to do it. The system will test how strong you are, or how strong you are not. I have really been impressed with the quality of people who are coming into the marine policy area, and into government policy generally — people who are a lot more committed. Therefore, I think you should disabuse yourself of the idea that the choice in public policy is always one between rationality and irrationality. The choices are more frequently between values and subjective goals.

But I guess, last of all, what the system really needs is well-educated, well-trained, and committed people. All the processes and all the organization that exist cannot be substituted for that quality. I hope that those of you here who are just starting your careers will think about entering government, because I think the ocean policy area is a fascinating one, one that is bound to grow, albeit in complexity, red tape, and all those things that Charlie Matthews of the National Ocean Industries Association says he doesn't like. Nonetheless, I think there is a future in ocean policy and that it is an area in which an individual can still make an impact.

Thank you very much, and, again, it's a pleasure to be here in Rhode Island.

Ocean Management: Future Perspectives

Samuel A. Bleicher
Director, Office of Ocean Management, NOAA

Ocean-use decisions are no longer a minor sideshow in the domestic policy arena. Ocean resources are a critical ingredient in the continued health and prosperity of the nation. The oceans already provide this nation with important sources of food, fuel, transportation, fish and wildlife habitats, and recreation. With each day that passes we learn more about the oceans and the resources they contain. And with each new day we improve our capability to use those resources for greater benefit.

But it is imperative that we realize that every advance in ocean technology increases demands for ocean space and ocean resources, thus creating additional risks of environmental degradation, conflicts among ocean users, or irreversible damage to the ocean resource base. This situation presents a special kind of challenge to government planners and policy makers, a challenge which we are only beginning to address. This evening I would like to share with you some preliminary ideas that I hope will eventually help to formulate an approach to oceans policy that reflects the multiple and interconnected character of national ocean use.

We must begin by keeping in mind that the legal regime applicable to the coastal oceans is in transformation. The Law of the Sea negotiations have not concluded, but the coastal ocean is already changing from an internationally regulated area subject to occasional and limited national assertions of authority to a nationally controlled zone in which international interests are accommodated.

In a very real sense this metamorphosis from international to national dominance has been dictated by practical considerations. As our oceans' capabilities increase, the national interest in ocean resources is expanding, creating a pressing need for governmental action. The level of offshore activity has now grown to such a point that government must review the national oceans effort to ensure that government policies and programs can achieve wise resource use for the benefit of this and succeeding generations.

The design of long-range approaches to ocean-use coordination requires that we first consider the nature of the oceans and the characteristics of ocean activities. Do they require a management approach different from those used on public lands or in the coastal zone? I suggest that they do.

The oceans do not necessarily require a separate organization for their management. But the peculiar physical and legal characteristics of the oceans deserve consistent, careful consideration in all the varied government ocean programs and every aspect of national oceans policy. Let me first review the physical characteristics:

- Physical constraints that do not exist on land are everywhere present for the

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ocean user. The oceans remain a hostile environment for human activities despite our growing technological capabilities. Man's natural habitat is land. In the oceans he is an intruder. His attempts to extract renewable and nonrenewable resources or even to enjoy the recreational and aesthetic pleasures of the oceans can be forcefully and capriciously thwarted by wind, wave, and storm.

•Although we have learned a great deal about how to function in an ocean environment, ocean technologies are still relatively primitive. Procedures are not standardized, performance requirements are poorly understood, and each technological effort tends to be approached independently. As a result, men and women working in the oceans face greater uncertainty about their ability to complete successfully a mission than they would under similar circumstances on land.

•Ocean-use planners can never disregard the fact that the oceans are a fluid medium in which it is practically impossible to confine the effects of a given activity to a specific area. Therefore, the impacts of each specific ocean use have potential implications for the entire spectrum of ocean activities and resources.

The political and legal structure applicable to the coastal ocean is also quite distinct from that on land:

•The federal government, not the states, has sovereignty over the coastal ocean beyond three miles from shore. On the other hand, the Coastal Zone Management Act consistency provisions ensure state involvement, and as a matter of policy the federal government seeks to involve states deeply in decisions about ocean uses.

•Unlike land, where large areas are private property, authority to use the oceans rests with the federal government. Private sector uses are licensed or regulated, consistent with the goals of achieving optimum benefits for the nation from the oceans.

•The extent of foreign rights in the coastal oceans may be the most unique legal characteristic. Foreign vessels have the right to transit United States waters so long as they are in innocent passage. The federal government allows foreign fishing vessels to take fish within the nation's 200-mile economic zone. Foreign nations or individuals under their control have certain rights, subject to limited control of the federal government, to conduct scientific research and to lay pipelines and cables.

Clearly, the oceans have a unique set of physical, legal, and political characteristics which call for a specially designed set of policies and programs.

Government is only just beginning to address these issues in a coordinated fashion and with sensitivity to the interrelationships among various ocean activities. A multitude of federal agencies have extended or seek to extend their missions into the coastal ocean, greatly complicating the process of coordination. Two of these agencies, NOAA and the Coast Guard, are principally focused on ocean matters. Others, such as the Department of the Interior, Environmental Protection Agency, Corps of Engineers, Department of Energy, and Department of Defense, are primarily interested in the ocean only as a location in which their nonocean missions can be supplemented or enhanced. A significant portion of government programs in the oceans are conducted by agencies without a mandate to plan for and protect the nation's overall oceans interests.

Increasingly, government policy and national legislation have recognized the need for a national oceans effort which is tailored to the distinctive characteristics of the oceans and which will maximize national ocean use consistent with environmental protection requirements. But the task before us is not a simple one; nor is it one that can be solved by additional statements of policy. It requires coherent and consistent implementation of oceans pol-

icy based on a shared perception of national goals and objectives. The intent of such an approach is not to restrict certain ocean users or programs but to encourage the broadest possible spectrum of national ocean uses, through consideration of all national interests in the oceans, and conservation of ocean resources for future generations.

We at NOAA are convinced that by concentrating on improving coordination within the existing federal oceans programs we can begin the work of improving ocean-use decisions. The Office of Ocean Management was created in November of 1977 by the Administrator of NOAA to initiate NOAA's efforts in this area. The Office is mandated to address certain critical needs in our national approach to ocean affairs: to bring NOAA's data, research, and monitoring capabilities to bear upon the ocean-use decisions confronting the government; to ensure that federal ocean-use decisions take into account existing and potential conflicts with other ocean uses; and to provide protection for distinctively valuable ocean areas through planning and management of potentially damaging human activities in these areas.

The Office of Ocean Management has already undertaken three initial efforts designed to pursue these objectives. First, we are developing an ocean-use evaluation capability. We will be gathering a broad range of economic, environmental, and social information about the entire range of ocean uses. Then we will work to generate techniques for evaluating them in light of national goals and priorities. Second, the Office of Ocean Management is working to assist in improving the quality of federal ocean-use decisions by making information unique to NOAA available for the planning and policy-making efforts of agencies responsible for ocean programs. To this end, we are establishing constructive, supportive relationships with such agencies as the Bureau of Land Management, the Coast Guard, the Environmental Protection Agency, and of course the Office of Coastal Zone Management and the National Marine Fisheries Service in NOAA. Finally, we are implementing the marine sanctuaries program in order to protect distinctively valuable ocean resources as mandated by the Marine Sanctuaries Act. This effort involves comprehensive planning and evaluation for these areas as well as on-site regulation and enforcement.

In addition to these specific activities, the Office of Ocean Management is participating in other efforts aimed at generating a new domestic ocean policy, including the Department of Commerce Oceans Policy Study, the President's Reorganization Project Natural Resources/Environmental Study, and the Oceans Policy Presidential Review Memorandum. These review efforts will address the broad institutional and programmatic policy issues involved in jurisdiction, comprehensive ocean and coastal resource management, marine environmental protection, marine science, technology and information, and ocean services.

Ultimately, these efforts are designed to lay before the President alternative approaches for ocean-use decision-making and ocean programs in government. The President's decisions should establish policies for the management and use of ocean space and ocean resources so that the long-term benefits to society will be maximized.

I am hopeful that the steps taken by NOAA will help bring the federal government closer to the time when ocean-use decisions are more carefully tailored to the physical and political realities that govern them and more responsive to overall national priorities. Certain critical deficiencies can be identified that could be eliminated by an appropriate coordination system.

First, *no comprehensive ocean use plans exist, nor has any agency been given the responsibility or developed the capabilities to produce such plans.* Where the allocation of publicly owned resources is at issue, the government should ideally develop long-term, comprehensive plans for use of those resources. Such plans would identify existing and contemplated uses, analyze their inter-

relations, relate them to national objectives, and identify those which should be expanded and those that should be curtailed, both overall and in particular areas. No agency is currently engaged in this effort. Instead, mission agencies each make plans on the assumption that their respective missions are of the highest priority, and treat other concerns as constraints to be minimized or avoided.

Second, *no system exists for coordinated review and issuance of permits, licenses, and leases.* A typical offshore development requires review and authorization by a number of federal agencies, yet there is no system for coordinating the permit issuance process for specific installations.

Finally, *no system exists for mediation of potentially conflicting decisions.* If, for example, the Department of the Interior, the National Marine Fisheries Service, and the State of Massachusetts reach different conclusions about use of an area like Georges Bank, no forum other than a decision by the President — or the courts — is available for resolution of either interagency conflicts or conflicts with the interests of other major actors — the states, foreign governments, and private industry.

Many of the deficiencies in the overall federal oceans effort can be remedied without significant organizational changes. Coordinating procedures among federal agencies to ensure that all interests are properly reflected could be achieved by additional attention to long-range planning of ocean uses, joint review of permits, licenses and leases, or a system for mediation of disagreements. These procedures could extend to the full range of participants in ocean-use decisions such as states, private parties, or public interest groups. In combination, these changes could enable the nation to forego an oceans effort that focuses the multitude of oceans interests on achievement of national priorities and goals.

The questions I have touched on tonight are only a brief, generalized view of those which must be addressed if we are to construct a rational, comprehensive system of ocean management. These and other related issues deserve much more detailed consideration within government and in consultation with experienced individuals such as those gathered here.

Let me emphasize that we have before us an unparalleled opportunity. The nation's ocean resources can enhance virtually every aspect of national life. We can learn now to manage those resources wisely before the scope of ocean use is so extensive that planning efforts are overwhelmed. If we do so, the oceans and their renewable resources will be a valuable legacy to succeeding generations.

I am excited and challenged by the opportunities ahead. I look forward to working with you and welcome your ideas and your assistance.

MAJOR MARINE POLICY DECISIONS: CASE STUDIES

Timothy M. Hennessey, *Session Chairman*
Political Science, University of Rhode Island

Coastal Energy Impact Program

Robert Knecht
Director, Office of Coastal Zone Management, NOAA

It's good to be at the URI conference again this year. Again, as last year, I have the pleasure of being part of the opening session on a somewhat obscure topic. What I want to try to do is to help set the stage for the more detailed discussions to follow. I won't, in fact, concentrate on the Coastal Energy Impact Program, despite the program title. I want to talk about the subject in a somewhat broader vein. CEIP will be discussed this afternoon, and tomorrow as well, in various contexts.

I'd like to divide my remarks into three parts. First, some general observations on the nature of policy formulation as a process. Next, I'd like to use both the Coastal Energy Impact Program and the Coastal Zone Management Program as specific examples of marine policy formulation and discuss some of the constraints that seem to me to have been important in how those programs have developed to date. Lastly, I'll comment on the limitations and constraints in marine policy formulation in a general sense, and what is peculiar about marine policy formulation that adds additional difficulty in trying to develop rational policy.

What about policy formulation as a process? What is policy? Why do we need it? How do we formulate it? Who formulates it?

I don't mean to go through Political Science 1A or Civics 1B, but it's helpful to think about this before thinking about the limits to rational policy formulation. What is policy? Well, to me, it is a statement of a goal, a set of values or priorities with regard to a particular area of concern. Why do we need it? We need it because it sets future directions. It guides decision-making. It increases certainty. It increases predictability. It reduces social friction and conflict to the extent that it provides a road map, or a set of signposts for the future.

Who formulates policy? Generally, it's set by the policy-making body, empowered by the people to set policy in that area. In our system, with regard to national policy, I feel that it is a divided responsibility between the U.S. Congress and the Executive Branch, in partnership with the states and local governments. While the textbooks might suggest that national policy formulation was largely a function of the Congress, in fact, in many ways, the Executive Branch is also at the table in a very real sense.

I think that the Executive Branch in its development of regulations, program policies, and in its administration of programs sets important policy directions, hopefully in harmony with the Congress, but occasionally in conflict with it.

When is policy made, in a general sense? The short answer is "When a serious problem occurs." It's often made very late in the game. Occasionally, we're out in front in making policy in the form of plans but too frequently, it seems to me, it's a game of catch-up ball.

How is it made? Here again, I think the short answer is "Usually not very well" — often under the gun, with immediate problems at hand. We seem to have difficulty getting the timing right. We're either too far in advance, when the problems are not well shaped and the information is too sketchy, and the results are

put on the shelf, or we're too late, in an atmosphere of crisis, and emotions have built to the level that Senator Pell referred to this morning, and the decisions, therefore, are not often logically based. Typically, we have too little information, not the right information, we lack information about long-term consequences or secondary impacts, and we have too narrow a view.

Let's look for a moment at the stages of national policy formulation and implementation, and the constraints that appear to be present. When I think about the process of national policy formulation and implementation, four stages come to mind. First, the conceptual stage — the development of a concept. Second, the legislative stage — the legislative process that puts that concept into the law books. Third, the implementation phase — the preparation of rules and regulations for administering the program. And, fourth, what I call the "adjustment" phase — in which feedback on the initial operation of the program requires refining the legislation, adjusting the administration, firing the administrator, or what have you. I'd like to comment on these four stages with regard to the constraints that could be present.

Typically, in the conceptual stage, probably the main constraint, at least in terms of this conference, would be a lack of data and information. In this very early stage, the details of the problem may not be totally understood. As the legislative process takes over, what constraints enter at that point? The lack of data and information, truly, but here the principal constraint is "private opinion" (in contrast to public opinion). I think that this fourth factor needs to be added to the three that are in the conference brochure. By "private opinion" I mean the opinions of the special interests that are going to be affected by the policy under formulation. Private opinion, at the point of the legislative process, is fundamental to the outcome, in my judgment.

"Jurisdictional complexity" is also important at that stage, obviously, as was mentioned earlier this morning. At the third stage, the implementation stage, the lack of data and information is again a principal constraint, although jurisdictional complexity makes the problem more complicated as well. I don't think that the private opinion or public opinion aspects are as important at that stage, though perhaps they should be.

Fourth, the adjustment phase; here public opinion again becomes very important as a constraint, as does private opinion. Really, the question becomes how well the program is serving the end users, which are the special interests and the public at large.

One could ask, At what stage in this process is energy policy? I think it's in the legislative phase, largely, although some of the concepts are still being argued over. The Endangered Species Act is an interesting case in point. I would argue that it's about to move into the adjustment phase. With the Supreme Court decision involving the snail darter, I think we will see an effort by the Congress to adjust that legislation and to add some flexibility that perhaps they thought was there in the beginning. The Coastal Zone Management Program, as well, I think is moving into the adjustment phase. Results are now being obtained from the initial expression of the legislation. Some of the special interests that are intimately involved feel that their interests are not adequately served by the products that are emerging in the first round. Consequently, I think we will see an adjustment of the legislation for round two. Local and state property tax policy, as well, is certainly in the adjustment phase in certain states.

So much for laying a framework for policy formulation in a rudimentary way. I'd like now to move into part two of my remarks, and discuss the Coastal Energy Impact Program and the Coastal Zone Management Program as examples of marine policy formulation.

The Coastal Energy Impact Program first. In 1976, Congress added an important provision to the Coastal Zone Management Act which was aimed at recognizing federal responsibility to assist states and communities in dealing with the adverse impacts along their shorelines of development of additional energy supplies. I

think no one disagreed with this overall objective. The environmentalists supported it, the energy industry supported it, the states and federal government supported it. The arguments centered on the means to meet that objective.

There were certain principles that we felt were important in establishing a coastal energy impact program. First of all, those involved in developing energy resources should pay the full cost of development, including the socioeconomic and environmental costs attributed to the development. That is to say, any costs that can be attributed to energy development ought to be paid for by the consumer of the products of that energy development.

Second, since new energy activity benefits the entire nation, any local fiscal and environmental risks should be shifted from the coastal states and communities to the federal government when they cannot be assumed by the end users of the energy.

Third, coastal states and communities should assume the primary responsibility for planning and providing the needed public facilities and services, and financing them from increased tax revenues created by the new or expanded energy activity. The federal role should be complimentary in nature.

Fourth, federal impact assistance should be provided in a manner that acts as an incentive to federal agencies, states, and communities to work together to develop mechanisms that ensure that the right amount of money reaches the point of need at the right time.

Last, the federal impact aid should not operate as an incentive to locate energy facilities in the coastal zone which could or should be located inland, and it should not encourage unnecessary growth in the coastal zone.

Those were the characteristics of a rational scheme, at least as we saw them. There were also some operating principles that we were trying to achieve. Money should be available where needed, and both shortfalls and windfalls should be avoided; that is, the amount of federal aid available to an impacted community or state should be tailored to the need. Second, money should be available before the impacts occur, when it's needed most. Third, the assistance program should be as simple as possible to administer, with maximum discretion and control going to state and local governments, and the impact assistance program should be linked closely to the coastal management programs of the states involved.

Three widely divergent points of view were held in the Congress. One approach advocated a "net adverse impacts" scheme for providing aid, principally put forward by the Senate National Ocean Policy Study. The idea here was that you should try to estimate the gains and the losses to the community of a particular energy facility or activity, subtract one from the other, and, if there is a net adverse impact, provide a grant or other financial aid to cover the gap. In other words, if the benefits, in terms of increased employment, increased tax base, and other positive aspects, were outweighed by the negative aspects due to the additional costs of the facilities, services, schools, etc., then you make up the difference. Soundly based theoretically, but very difficult to compute in advance for the lifetime of a facility.

The second theory involved a straight revenue-sharing approach, and this was advocated by some of the states; notably, the Gulf States, and Louisiana in particular. Industry, as well, supported this approach. This is the old ideal that the coastal states ought to share in the revenues that the federal government obtains from oil and gas activity on the outer continental shelf adjacent to the state in question. After all, the people who work on those offshore leases go to school and live in and make an impact on the adjacent communities. This is a very popular idea: it roughly coincided with the sharing of mineral royalties in the inland states; it was easy to understand and easy to administer. The more activity you have offshore, the larger the impact onshore. But one of the arguments against it was that such a scheme didn't require any matching of the amount of money available with real need.

The third theory was that this really ought to be a loan program. This was understandably

the Administration's position. The problem was seen as principally one of cash flow. The community had a lot of oil and gas workers coming in, and though the tax monies wouldn't come in for one or two years yet, the new schools, the clinics, the larger water treatment plants, etc., were needed now. The Administration's approach was to make available "up-front" money, on a loan basis, to help communities deal with these problems. The communities would then pay back the loans from the increased tax revenues.

These were the three contrasting views, oversimplified somewhat. The result was that we ended up with a very complex program which had a mix of provisions that contained a bit of each. Thus, there are four financial elements in the program. We have planning assistance grants and formula grants which bear some relation to the revenue-sharing idea except that the state, in order to obtain the allocated money, has to propose specific projects that reduce impacts. We have a loan complement in the program (the largest at 220 million out of 250 million) and we have a repayment assistance provision which converts the loans into grants when communities, for certain specific reasons, can't pay back the loans.

The program that resulted fails in several ways to be totally rational. It is complex, and one of the goals was to make it simple. The workability of the loan feature is in question at the moment, because of the possibility of a high interest rate. But really it is too early to tell. There's been very little onshore development yet in frontier areas. Until significant oil and gas finds are made, and substantial onshore development occurs, I think we won't really be able to test the rationality of this program.

Here the factors that shaped the final form of this program were not so much constraints as a part of the reality of the situation. These other points of view were real and are strongly felt, and in fact to be fully viable a rational program had to acknowledge and incorporate them.

Let me say a couple of words in the same context about the Coastal Zone Management Program. What are the major policy formulation efforts in a program like the Coastal Zone Management Program? At the federal level, the creation of the legislation was the initial policy formulation effort by Congress, and it was a very important one. It said some very important things about the balance in future coastal resource allocation between federal, state, and local governments.

Second, in my mind, the drafting of the regulations was an important aspect of the further development of this marine policy statement, especially since the Coastal Zone Management Act, in its original form, was very broadly and flexibly worded. A lot of interpretation was required as a part of the regulation writing.

Third, the operations of the grant program. Over the past four years, we've given several hundred grants to states. Into each of these grants has been written certain conditions. For each grant, a judgment had to be made at the federal level as to whether the state was proposing a program that would meet federal requirements.

Last, and perhaps the most important, is the approval of state programs. Is not the federal approval of the Massachusetts Coastal Zone Management Program a slice of marine policy formulation? I think it really is. As many of you know, these approvals are controversial — some interests say that a particular state program does not go far enough in a particular area. The federal OCZM has to make the final judgment in this regard.

At the state level of government, it seems to me that the formulation of marine policy occurs as the state shapes a coastal management program to meet its purposes. How is state X going to use coastal zone management? To achieve what? To redress the development-conservation balance and move its coastal zone in the future more toward recreation purposes? To continue to favor economic development and close the income gap of its people? Second, the decision on what *authorities* the state is going to achieve its coastal goods is a substantial policy question. And, last, the role

of local governments in partnership with the state is certainly a fundamental policy issue.

In my judgment, the most important factor or *constraint* to rational decision-making in the development of state coastal management programs is the network of existing vested special interests, both governmental and private. Somebody earlier, in the question period, referred to government as having special interests on occasion as well, and that's absolutely true.

The objective of these interests is invariably to protect existing arrangements and existing power bases; that's true whether it's government or private. This has to be viewed as a principal constraint on the development and implementation of effective and fully rational state CZM programs.

The scene from the federal perspective, then, pits a voluntary federal effort, using grants and aid as the principal tools against some very strong and entrenched forces that stand foursquare for the status quo. Nonetheless, under the aegis of the CZM program, very important gains have been made in rational coastal decision-making in many coastal states. Take, for example, the South Carolina program. Senator Waddell, who heads that program, is here today, and the staff director, Dr. Wayne Beam, is here also. South Carolina is a good case in point. That state had essentially no coastal permitting process, no coastal policies, no mandate for development of a comprehensive plan. Yet now, after four years of effort, they have all of those things. They have a CZM program into which the state is putting twice as many of its own dollars as it did before — half a million dollars of state money in addition to the federal money — and that program is making substantial progress.

I'd like to close with a couple of general remarks on the limitations and constraints that seem peculiar to marine policy formulation. Let me just touch on two. The oceans and the coasts are not yet seen as an important organizing theme. Most people do not think about the problems facing them under these headings. As yet, there is no broad public interest in ocean or marine-related matters. Even among the special interests, the ocean aspect is often a minor concern. In the energy area, the ocean elements of the energy picture are still relatively minor. All of the oil and gas in the continental shelves wouldn't meet our energy requirements for many years. When you stop to think about those special interests that are solely devoted to the oceans, you come up with perhaps only three or four: marine fisheries, the Navy and other defense aspects of the oceans, the Coast Guard's activities, and marine transportation. Until the oceans and coasts are seen as an important organizing theme, a fully rational marine policy formulation will be difficult if not impossible.

A couple of final comments. An improved situation with regard to marine policy formulation could arise in several different ways. It could arise in a "top-down" way. It could be the outcome, for example, of a successful effort to develop a Presidential decision memorandum in this area. The Stratton Commission, in a sense, was that kind of top-down effort, and it made substantial gains, although it wasn't all that people wanted it to be. A second way to the situation, perhaps, would be through a kind of de facto process in which gradually, with improved descriptions of what is and what could be, incremental improvements are made through improved understanding of the interrelationships and the benefits that would come from closer coordination and cooperation.

A third way would be a "bottom-up" approach to the formulation of marine policy. This could result, in my view, from the extension of policies developed by coastal states. As a part of their current coastal zone management efforts, the states are beginning to join together in regional bodies that over time could have an important bearing on policy. The Outer Continental Shelf Lands Act and the Fishery Conservation and Management Act will build the states, as partners, into important aspects of ocean policy. I think we're going to see more of this kind of bottom-up contribution to the development and formulation of marine policy.

The New England Fishery Council: Problems and Prospects

Spencer Appolonio
Executive Director, New England Fishery Management Council

If the 200-mile-limit management act were a simple matter of conserving and rebuilding fish stocks, there would probably be little or no problem. The management of fish is relatively well understood and straightforward. At the present time, however, there are substantial problems, mainly because in New England, at least, the management of fish requires management of fishermen, and that is not a simple problem. Management of people must always be the most difficult kind of regulatory action, and in the example of New England fisheries, it is compounded by the diversity of the fishing interests and traditional fishing practices, and by the intermixed and migrating stocks of fish upon which the industry depends.

The fisheries off New England are nearly all fully exploited. The New England fishing fleet is neither inefficient nor undercapitalized, and it probably is fully capable of overfishing the stocks either in their present condition or if they were fully restored to the condition that existed prior to the arrival of foreign fleets in the 1960s. Many fishermen will deny this, but the fact is that we overfished at least some of our resources prior to the arrival of foreign fleets, and there is good reason to believe that early in the nineteenth century New England fishermen also overfished cod on Georges Bank. The technological efficiency of a modern stern trawler in New England is as good as that of any vessel in the world and is significantly greater than that of a New England dragger of the 1950s, prior to the arrival of the foreign fleets.

With the present harvesting capability of our fleet and with the present condition of the stocks, the problem of management is primarily that of allocation — that of determining who gets to take how much of a limited resource. And since there are more than enough people and vessels to take the available resource, the allocation decisions — the management of people — becomes paramount and difficult. Under the present instructional arrangements it may indeed be impossible.

I will outline the thinking and actions that led to the present unsatisfactory situation in the management of New England groundfish, but it is useful, first, to summarize the historical developments that led to the 200-mile act in its present form. However distasteful it may be in a philosophical sense, the act is a negation of the concept of freedom of the seas. Much of early America's prosperity was dependent upon mercantile and fisheries freedom of the seas — we justified two wars on that issue — and much of the recent prosperity of our fishing fleet was based upon freedom of the seas. Why the act is a negation of that concept, and how it came about, is worth keeping in mind as we consider the immediate problems in New England.

In order to protect seventeenth-century Dutch mercantile interests, Hugo Grotius promoted the then novel concept of freedom of

Due to illness, Mr. Appolonio was unable to attend the conference and delivered his paper at a special lecture at the University of Rhode Island on November 1, 1978.

the seas, based on two premises which seemed indisputable: first, that property rights in the sea, even if needed, could not be maintained in any way comparable to property rights on land; and second, that property rights in the sea were not needed because the resources of the sea were inexhaustible and therefore the protection, conservation, and enhancement of marine resources through property rights were unnecessary even if possible. Since no one could own the seas, nor, indeed, even if they did, could they hope to realize conventional benefits of property rights, the seas belonged to no one, and all were therefore free to do as they pleased. The essentially negative Dutch proposition eventually prevailed, of course, and it is interesting that certain features of the concept were formalized as late as the 1958 Law of the Sea Convention, which also began to erode the concept.

In the late nineteenth century, when freedom of the seas was not disputed, the first crack appeared. It is interesting that at that time English fishermen were greatly concerned that North Sea stocks were overfished and insisted that the government do something. The government, after lengthy deliberation, and in spite of testimony from the fishermen, reaffirmed the Grotian premise that the fisheries were inexhaustible and that no effective action was possible or necessary. It is ironic that now in New England those positions of fishermen and government officials are nearly reversed.

At the turn of the century, total world fish landings were about 3 to 4 million tons. At the beginning of the second World War, they were about 20 million tons, and they seem to have peaked at about 20 million tons in the late 1960s in spite of greater effort, more efficient vessels, and the exploitation of new fishing areas. At the same time as this growing demand for protein from the sea, there was of course increasing interest in sub-marine oil and hard minerals coincident with the emergence of many new nations. At least 100 more nations, all with an interest in the resources of the sea, attended the most recent Law of the Sea Conference than attended the 1954 UN Rome conference. The convergence of all these factors led to the United Nations declaring in 1970 that the resources of the sea are the "common heritage of all mankind," that coastal states, therefore, have a duty to conserve and manage the resources for full and optimum yield, and that because of that responsibility coastal states have preference in the use of those resources. The United States subscribes to those principles. They are a sharp departure from the principles of freedom of the seas because, contrary to Grotius, they clearly say that the resources are exhaustible, that they can and shall be managed, and that property rights of the sea can be established and maintained. Further, they say that coastal states have a duty — an obligation — to do many of these things. The negative Grotius principle has become reversed to require management of resources, which are owned by everyone, and property rights are acceptable to the degree necessary to accomplish these ends.

All of these ideas are incorporated, as appropriate, in our 200-mile act. It was because of this — that the act undermined the premises of freedom of the seas — that the U.S. tuna fleet so vehemently opposed the 200-mile act. The act, significantly, does not say the United States has property rights to the fishery resources of our coasts, but only preferential use rights. It does say that all fisheries *shall* be managed for full and optimum yield. There is no discretion permitted in this directive, and the objective of full and optimum use is subject to all kinds of acrimonious interpretation and is full of potential difficulties.

It leads, for example, to very difficult scientific judgment as to what is an acceptable biological catch for full utilization — it depends upon whether one takes a narrow, single-species view of the fish world or whether one has a profound and quantifiable appreciation of the subtleties of species interactions within an intricate and flexible marine ecosystem. It certainly was intended to guarantee that there would be foreign utilization of the resources

off our coasts, just as much as it was clearly intended to assure, as far as possible, U.S. fishing off the coasts of other nations.

Nearly concurrent with the evolution of international policy on the utilization or management of marine resources, there was a significant change in thinking on the property goals of fishery management. I believe it was in the late 1930s that the concept of maximum sustainable yield emerged, and it prevailed until perhaps the early 1960s, when economists successfully pointed out that MSY may lead to wasteful, inefficient use of economic resources. Maximum net economic yield therefore enjoyed a brief popularity, but was soon replaced by optimum yield when the argument was made that there may be legitimate goals of fishery management that pertain to aesthetic, social, or perhaps other nonquantifiable considerations. By this time, 1978, MSY has been thoroughly discredited even as a valid biological objective, fishery biologists saying that MSY for most species is a myth at least for practical management purposes within a reasonable period of time. And in spite of the best efforts of many diligent people, there is no working definition of optimum yield. It is interesting that even though there had been many international fisheries agreements in the nineteenth and twentieth centuries, very few of them were concerned at all with resource conservation. Most of them were directed primarily to resolution of fishing conflicts and to resource allocation. Only as late as 1958, as the world's fisheries approached the present plateau of 70 million tons of total landings, was there general international agreement that fisheries agreements should be directed to resource conservation as well as allocation. The Fishery Conservation and Management Act incorporate all this history of policy and thinking. Further, it takes note of long-standing problems and traditions of domestic fishery management, including the fact that with few exceptions the federal government has never managed fisheries in this country, and that the states do not have an unblemished record of successful marine fish management. It is within the framework of this historic development and the requirements of the act that the New England Council undertook the management of groundfish.

The act requires the preparation of fisheries management plans upon which regulations shall be based. One of the early difficulties was to appreciate the importance of clearly defining the objectives of a management plan. It seems obvious that a plan shall have an objective, but it is neither obvious what those objectives should be, nor easy to formulate them in such a way as to lead to rational and practical plan development. The only guidance from Congress in the act is that fisheries shall be managed to achieve the objective of optimum yield, but since that is defined to include all relevant considerations it is hardly a helpful directive.

Clearly, without a more specific objective it is almost impossible to write a practical management plan, nor is there any standard for judging its effectiveness. The original New England groundfish plan is an example of this. It might,indeed, exemplify the Danish proverb which maintains that "no man is completely useless; he can always serve as a bad example." The fact of the matter is that the original plan is hopelessly inadequate, has been distorted out of all recognition, did not contain elements essential to success, and indeed can only serve as an example of what not to do.

It originally contained an implied, but not stated, single and simple biological objective; namely, preservation or restoration of cod, haddock, and yellowtail stocks at or to a not very clearly defined level of greater biomass. It set annual quotas to achieve those somewhat vague levels of biomass. Because the quotas were set higher than domestic catch records in recent years, no difficulties were anticipated. But the plan contained no appreciation or analysis of the potential for expansion of the New England fleet, and that deficiency very quickly led to serious difficulty.

It soon became obvious that the cod and haddock quotas would be taken about five months after the start of the first year, 1977.

This would clearly lead to market gluts, price depreciation, waste of resource, and idling the fleet for half a year. The Council therefore instituted quarterly allocations, very similar to the concept of yellowtail quarterly quotas previously instituted by Massachusetts, for the purpose of spreading the catch throughout the year and thus, hopefully, avoiding the problems inherent in a simple, single annual quota. This action, of course, changes the purpose of the plan. It is no longer simply a plan with a biological objective, but now has a major economic objective.

But the quarterly allocations led to further difficulties. Because of differing fishing capabilities of various vessel classes, weather characteristics, and migratory or seasonal availability patterns of the fish, various segments of the fishery found themselves in danger of being shut out by the taking of the quarterly allocation before they had opportunity to take fish. This problem then led to various proposals to allocate quotas to specific vessel classes, in an attempt to ensure that each had a reasonable opportunity to harvest a "fair share" of the resource, and to prevent the exclusion of any segment because of the excessively greater competitive ability of another segment. Such vessel-class distinctions are of necessity rather arbitrary, and the concept almost inevitably leads to pressure for establishing more "special" classes, each with its "unique" problems. The incorporation of vessel-class allocation implicitly set new plan objectives, neither biological nor economic, but now largely sociological, or at least socioeconomic, in nature.

Even with vessel-class allocations established, the problems still persisted. Weekly catch or trip limitations by vessel class were added, in an attempt to spin out the quarterly allocations as long as possible, to minimize the prospects of extended closures within any one quarter for any vessel class. Along its path of evolution, the plan accumulated other quotas for certain charter or head boat vessels, geographical quotas, and Canadian allocations; and as the cumulative harvest of cod and haddock approached the point of exceeding the total allowable catch, weekly or trip limitations for cod and haddock were reduced, in vain attempts to prevent closures of the fisheries. The reduced trip limits, of course, amounted to de facto economic closures, but, equally important, they induced widespread violation of an noncompliance with the law and probably a significant reduction in the reliability of landings data. The combination of all these quotas, allocations, and trip limitations, incidentally, probably amounts to considerably more than 100 different quotas of various kinds. At one time there were at least 50 numbers in effect in one way or another. These estimates are approximate because no one has bothered, so far as I know, to make an accurate count.

The confusing, difficult, painful, and largely ineffective evolution of the groundfish plan has come about, at least in significant part, because the purpose of management, or the objectives of the plan, were never clearly considered nor explicitly stated. The frequent changing regulations reflect this fact and contributed to the confusion of purpose. The original plan did not state why the stocks had to be maintained or restored to certain not well-defined levels; nor did it address the fact that in order to do this, very difficult allocation issues would have to be confronted in realistic and practical terms. I would like to say at this point that these observations are not intended as criticisms specifically of the New England Council, for whom I work. Indeed, I doubt very much that anyone in the beginning adequately forecast or even thought seriously about the problems inherent in this fishery. The record gives no hint of such foresight. And I am very sure that even now no one, including the industry, the National Marine Fisheries Service, the Northeast Fishery Center, and the Council, has a clear understanding of how to solve the problem. It is worth keeping in mind, so that we may all be equally sobered by the recent history of groundfish management, that many of the important and ineffective characteristics of the groundfish plan were incor-

porated at the urging — indeed, at the insistence — of several segments of the industry. For whatever it is worth, the Council has recently been partially consoled with the advice that management of similar resources in the northeast Atlantic has encountered comparable problems. The Europeans have adopted optimum yield as their management objective, have equal difficulty in defining it, have difficulty reconciling management philosophies — or interpretations of what is optimum yield — among nations in and out of the European Economic Community, and have communications problems between the resource scientists and the managers at least as serious as our own.

The 200-mile act sets seven national standards to which all management plans must conform. It can be argued that the present Atlantic groundfish plan fails to comply with at least five of them. First, probably because of considerable noncompliance with the regulations or falsification of landings records, it does not prevent overfishing and at this time is not achieving optimum yield, however defined. Second, these realities are probably also distorting the scientific information upon which assessments and plans must be based. Third, the plan has been accused of discriminating among fishermen of different states, regions, ports, and vessel classes. Fourth, the allocation system does not promote efficiency or utilization of the resources. Indeed, it does the opposite. Fifth, the regulations do not minimize the costs of fishing, enforcement, or administration, but instead increase all of them to the point where effective enforcement costs may be more than the net value of the fisheries or more than society is willing to pay. Certainly, effective enforcement at this time may cost more than the available resources permit. It is debatable whether the plan is related at all to the other two standards: (1) management of stocks as units throughout their ranges, and (2) accounting for variations among the contingencies in fisheries resources and catches.

The Council's staff is now fully engaged in rewriting the groundfish plan and attempting to find a rational solution to the problem. It has established a procedure by which management objectives have been identified, thereby providing at least an initial direction for the development of a plan. It is developing analytical capabilities to assess objectively the various components — both commercial and recreational — of the groundfish industry and to assess the probable impact of various conceivable economic and biological management strategies on the industry and on the resource in the context of the stated objectives. The new groundfish plan will use these capabilities and analyses to provide objective advice on how to manage the various and diverse components of the fishery to achieve the maximum net economic and social benefits over an extended period of time.

In the final judgment, however, it may be that these analyses carry implications or consequences that are not acceptable to the Council. This kind of resource management and resource allocation is a political process, and political decisions have not yet been conspicuously influenced by either scientific or other varieties of sophisticated analysis. While the capabilities of our fisheries scientists are among the best in the world, their judgments are only one of many elements in the management equation, and the validity of their prediction is diluted by their own rejection of the concept of MSY. Since fishermen, some of whom sit on the Council, have of necessity evolved highly opportunistic fishing strategies to take advantage of fish as they find them, they are skeptical of assurances of what tomorrow may bring, preferring to make their plans on the basis of what they see here and now. And since, under present thinking, there is no way to assure fishermen that what they forego today will be harvested with interest tomorrow, the problem of stock restoration under the pressures of the present harvesting capacity will probably defy harmonious and efficient solution for years to come.

Rhode Island Barrier Beach Regulations

John Lyons
Chairman, Rhode Island Coastal Resources Management Council

I am here today to talk about the day-to-day decisions that must be made by coastal resource management program managers and executive directors, and in order to enlighten you on just who we are here in Rhode Island, and what the Rhode Island Coastal Resources Management Council Program is.

I happen to know that there are many people here who are familiar with it. In fact, there are many people in this room who actually produced our coastal resources management program for us, and I would like to thank them for their tremendous job. What a fine program they were able to develop along with us.

Let me give you a little background of the Council itself. The Council was created back in 1969, by a group of concerned citizens who were very much interested in what was taking place in the coastal region of the state of Rhode Island. Rhode Island is a little different from most states. We're a very, very small state to begin with, and the most natural resource we have is Narragansett Bay. For your information, there is no one in Rhode Island who lives any farther than 25 miles from tidal waters, and there's no one who lives much farther than half an hour from the beach or tidal waters. As a result, that group of concerned citizens, under the direction of Governor Licht, came up with a proposal and placed it before the Assembly. We found that, through lack of education of the members of the Assembly and the people living in the coastal regions of the state, we were going to have a great deal of difficulty in having the legislation passed. It did not pass in 1970. Finally, in July 1971, a very strong piece of legislation was passed that created a Coastal Resources Management Council. The Council has 17 members: seven members are appointed by the governor, six by the speaker of the House of Representatives, two by the lieutenant governor, and two members serve ex officio as voting members — the director of the Department of Health, and the director of the Department of Environmental Management.

It was unusual to have a very strong piece of legislation passed before there was any kind of a program or plan to protect the coastal region of the state. We take a little credit and a little pride in the fact that we were in existence approximately 18 months before Washington created the federal office of Coastal Zone Management. We also like to stress that the mandate we received from the General Assembly — to preserve, protect, develop, and, where possible, restore the coastal resources of the state through a long-range comprehensive planning and management program — is found verbatum in the federal act. We like to think that they copied it from us.

We found ourselves then, with a very strong piece of legislation, and without a program or plan to implement its management

phase. With the creation of the Council, the University of Rhode Island developed a Coastal Resources Center primarily to provide the expertise necessary for a long-range planning program. We called upon the University to see what it could do about coming up with an overall program for us, and the suggestion was that we approach the program by bits and pieces, looking for the principal areas of concern that might first develop. The first pressure point to appear was barrier beaches. "Barrier beaches are narrow strips of land made of an unconsolidated material extending roughly parallel to the general coastal trend, and separated from the mainland by a relatively narrow body of fresh, brackish or saltwater or a wetland," to give the description as it appears in the Program. These barrier beaches in Rhode Island are primarily located down in the South County area. In your visit to the state, you'll probably see some barrier beaches — they're beautiful.

People were applying to build on the barrier beaches, but the Coastal Resources Center from various studies found that a barrier beach could not tolerate any kind of building. The Council immediately developed rules and regulations pertaining to barrier beaches. As soon as we said that all barrier beaches should be preserved, that there should be no more activity on them, that all building should be prohibited, we were challenged in court. We found that if we were going to mandate such a condition on barrier beaches, it would be necessary for us to buy them. One of the reasons that pressure was developing for building on the barrier beaches was the Flood Plan Insurance Program passed in 1969 and amended in 1972. Prior to the passing of this insurance program, the pressure to build on the barrier beach was very, very limited, primarily because of the risks involved. With the advent of the federal insurance program, the risk factor was removed, and you were able to build on the beach, and, providing you met certain regulations, insurance of the building was supplemented by the federal government.

We found that in South County, lands that in 1969 had sold for approximately $500 or $600 — a piece of property 60 by 100 or 150 feet — these same lands, because of flood plan insurance, were selling for $25,000 and $28,000, and the state was not able to buy any of the barrier beaches. We went back to the University of Rhode Island and came up with new rules and regulations pertaining to barrier beaches. We have now designated some barrier beaches as "developed" and other barrier beaches as "undeveloped." On the undeveloped barrier beaches, we still maintain that there should be no building or alterations of any kind. In the developed barrier beaches, rather than lose control, we came up with some very rational rules and regulations. For example, anyone who was going to build on a barrier beach would have to build behind the sand dune, would have to meet certain requirements for septic systems, and would have to have certain elevations that were mandatory under the flood plan insurance. We felt by doing this that we could probably limit the type of building and the amount of building to be done on the barrier beaches.

We have up to the present time been going along with this theory. We have found that the rules and regulations for the developed barrier beaches were still not realistic enough. We have found that the elevation prescribed in the Flood Plan Insurance Program should have been much higher, and we're in the process now of modifying our regulations. First, the elevation of the first floor is being raised six feet more, which puts most of them from 18 to 20 feet above mean high water. Second, we've been meeting with the Land Resources Division of the Department of Environmental Management, developing new rules, regulations, and policies for septic systems located on the beaches. And third, there has been a realistic approach taken by some of the landowners on the beach: at the present time, one individual is trying to donate his land on the barrier beaches to the town. In this way, we can probably salvage these beaches in the future. We are encouraging this approach, so much so that an appraisal being

made in South Kingstown on this particular piece of property, involving 30 lots, is being financed by the Council.

This is the day-to-day management of a barrier beach. We find that nothing is black and white. You can come in with the greatest of ideas, come up with the finest policies, and when you get in the old practical world, you have got to do some trading. In many instances, we have found it necessary to trade some environmental values for some economic values — as long as the ratio is beneficial, we are willing to trade off small environmental values for large economic benefits. During the last three to four years, we have been accepted by various agencies, we've built credibility with these agencies, and people who in the beginning were afraid we were going to be obstructionists are now looking to us for encouragement, asking us to promote their programs.

We feel that we here in Rhode Island more or less stumbled upon a concept that we are recommending to other people; it's an approach that can be used by other states in other types of endeavors. The Council seems to have the confidence of the people of the state, a confidence that an individual, regardless of his or her capability, cannot instill. This is true because the decisions of the Council are made in a jury-like manner. We recommend this same approach to solve other difficult problems in the state.

JURISDICTIONAL COMPLEXITY

Francis X. Cameron, *Session Chairman*
Geography and Marine Affairs, University of Rhode Island

Local Government Diversity and Federal Grant Programs: Lessons from the Coastal Energy Impact Program

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The increased prices of foreign petroleum products and continued increase in domestic energy consumption have provided incentives for expanded production of offshore oil and gas and the importation of Alaskan crude and foreign liquefied natural gas. The energy facilities associated with each of these energy sources may have major effects on land use and the social, economic, and natural environment in the coastal zone.

If all energy facilities generated net benefits for the state and local governments within which they were located, there would be no reason for the national government to encourage the development of energy facilities. However, because oil production may take place offshore and outside a state's taxing jurisdiction, or under a state or local government different from the one bearing the costs of providing public services to the associated population, it is possible for a state or local government to receive a negative fiscal impact from an energy development, in addition to whatever disruptions of the natural and social environments are brought about by the facility. Recognition of the potential for adverse impacts that would lead states and local governments to refuse the development of energy facilities in their areas has resulted in legislation designed to overcome this problem. It is the purpose of this analysis to briefly describe the nature of fiscal impacts from energy facilities and to analyze the program designed to deal with the Coastal Energy Impact Program. The focus of the analysis will be on how the diversity of state and local government and their revenue mechanisms make it extremely difficult to write into law a program that is simple in concept and to develop understandable regulations. This diversity and the resulting complexity of federal grant programs is inherent in the nature of our federal system. It is not something that can be eliminated by simply rewriting laws or regulations, and it has the potential for limiting the capacity of the federal government to control all aspects of coastal energy or any other policy.

Fiscal Impacts

States and local governments obtain their revenues from taxes and from user charges on individuals and businesses, or from grants and contracts from other units of government. The problem that arises with offshore energy developments is that the business tax portion of a state or local government's revenues is not applicable because the facility is beyond its taxing jurisdiction. Hence, it is possible that the revenues derived only from taxing individuals, without the business taxes, will be insufficent to cover the costs of providing public services to the people associated with the energy facility. While it was the issue of federal offshore oil and gas production that generated interest in the problem of negative fiscal impacts on state or local governments, it must be noted that any time an investment

occurs in one jurisdiction, while the associated population resides in another, there is a potential for a negative fiscal impact on the jurisdiction with the people and a tax windfall in the jurisdiction with the investment.

To support the idea that states bore negative fiscal impacts, both Texas and Louisiana sponsored studies to demonstrate negative effects.[1] These studies are cited many times in congressional hearings, even though subsequent analysis indicated each study was inaccurate and positive fiscal impacts were more likely than negative ones for each state as a whole.[2] Further analysis, sponsored by the Office of Technology Assessment for Congress, indicated that for a state and its local governments together the general pattern for offshore petroleum developments was three years of net fiscal costs during early exploration stages, several years of high fiscal surpluses during construction of facilities, and then moderate fiscal surpluses into the future.[3] The initial costs were generated by the need to service populations during the time when virtually no onshore business tax revenues could be expected. The ensuing large fiscal surpluses were the result of sales and use taxes on construction inputs, real estate transfer taxes, and property taxes generated by the onshore components of the offshore activity. The continuing surpluses were the result of property taxation on such onshore components as pipelines, tank farms, and the like. It should be noted that these conclusions were reached without inclusion of corporate income taxes on in-state activity (all coastal states but Texas and Washington have corporate income taxes) or business real personal property taxes on oil inventories. From the results of the OTA-sponsored analysis it would appear that the major problem was not likely to be long-run net negative fiscal impacts, because state and local governments have sufficient taxing mechanisms to capture revenues from onshore components of the activity. However, there are still fiscal problems, including: (1) the timing of costs of benefits — costs must be incurred to provide services for people before any revenues from business taxation could be anticipated, thus front-end costs could be high; (2) risk — a state or local government could borrow and invest in facilities to service people and the oil discovery might be smaller than anticipated, leaving the government with bonds to pay but insufficient revenues; and (3) spatial mismatch — even though offshore developments may result in long-run revenues for all state and local governments, if the onshore facilities are located in a state it is still possible for a state to bear net costs if it services people but the oil is landed in an adjacent state. Even more likely is that a particular local government would end up bearing the costs of servicing people while the oil is landed outside its jurisdiction. This result would be most likely where people clustered in coastal towns but the oil was landed or construction facilities were developed outside the town's boundaries. This problem is further complicated by the fact that most people reside under the jurisdiction of several local governments, each of which may have different boundaries. Among the most common local governments are not only countries and cities, but townships, school districts, and other special districts such as water districts, hospital districts, fire districts, port districts, park and recreation districts, and so on. In addition, different local governments use many different taxing mechanisms, such as the real property tax, personal property taxes, sales taxes, income taxes, payroll taxes, business taxes, and license fees and user charges. The likelihood that all people serving an energy facility and all onshore investments from the facility would occur under the same set of local government jurisdictions is very small in most parts of the country.

Recognition of the potential for negative fiscal impacts on some governments but not others led to a clear conceptual framework for an energy impact program. Such a program would need a mechanism for lending to cover front-end costs which could be repaid. It must be able to absorb the risk for government

investments when expected revenues did not materialize; and it must compensate state and local governments where a spatial mismatch left them in a negative fiscal position. In addition, planning funds and compensation to alleviate environmental and recreational damages caused by energy facilities were viewed as ways to reduce further disincentives for energy facility developments. Recognition that, in the absence of a spatial mismatch or risk, large positive fiscal benefits were likely and a desire to avoid excessive coastal developments for the sake of capturing federal windfalls also led to a concern for designing a program which would remove disincentives but not provide additional federal windfalls to state and local governments. This is a rather simple set of objectives that is well matched to the nature of the problem.

Alternative Funding Mechanisms

Several funding approaches were considered in hearings and analyses.

Shared Revenues

Some congressmen, notably from Louisiana, strongly advocated returning a share of federal royalty revenues to the adjacent state.[4] This approach was modeled after the federal return of a portion of mineral lease royalties from mining on federal lands. The shared-revenues approach has several deficiencies. First, it does not deal with the front-end cost problem. The costs of serving people would be incurred long before production generated royalty payments. Second, there is no clear way to see that royalty revenues go to the state or local governments, which bear the costs of servicing the energy facility population. Royalty sharing could be just a windfall benefit, on top of already high projected positive fiscal impacts for most states. And third, it would be unfair to noncoastal states to share royalties with only coastal states in a way not related to costs, because offshore lands were truly federally owned and not like federal mineral lands, which are all within the boundaries of particular states.

Formula Grants

Formula grants could be based on a variety of factors, including factors which would provide front-end funds not possible with royalty sharing. The major problem with reliance on formula grants exclusively, however, is that it would be impossible to develop a formula that would provide revenues to negatively affected state and local governments without simultaneously providing windfalls to others. The most difficult part of any formula is to determine how to treat the diverse nature of local governments within each state, or how to evaluate any state-designed formula for pass-through to see if the local governments that bore costs were actually compensated while others, including the state government itself, did not receive large windfalls. As will be seen, a component of a formula grant was provided in the Coastal Energy Impact Program for planning funds and environmental and recreational impact compensation.

Project Assistance

The most precise targeting of aid can be through individual project assistance. One can analyze any single energy facility impact and decide whether the affected government should receive a loan or a grant, determine the repayment schedule, and so on. This is the approach that could solve the energy impacts problem without generating large windfalls. Under an ideal set of regulations, any local government official contemplating approval of an energy facility would know his legal grounds for receiving federal funds to offset any adverse impacts. Thus, the more specific the rules, the safer he feels in anticipating federal decisions. At the same time Congress, in drafting laws, especially laws which may disperse over a billion dollars, also likes to bind administrators into a set of rules so that administrative decisions are those desired by Congress. In short, a reduction in administrative discretion usually increases the predictability of the program. The difficulty with project assistance to one of 80,000 local gov-

ernments, however, is that to reduce administrator discretion, the set of rules, including those guiding forecasts of population change, public service costs, and local government charges, must be extremely complex. Moreover, rules with sufficient scope to cover any possible energy facility impact in any possible local government jurisdiction would, on their face, be too complicated for any single local government official to understand because only 10 or 20 percent of the rules may actually apply to his situation. Both the resulting Coastal Energy Impact Program law and the regulations attempt to balance the achievement of CEIP objectives with reduction in administrator discretion in a diverse environment. However, early congressional reports appear to have severely underestimated the difficulty of achieving this balance.[5]

The Coastal Energy Impact Program Law[6]

The CEIP law establishes two funds: one is a fund for formula grants and is authorized $50 million a year for eight years; the other is the CEIP Fund of $800 million, basically for project-type assistance. The formula grant fund authorizes disbursement of money to states based on a formula taking into account the preceding year's federally leased acreage off that state's shores, oil and gas produced, and oil and gas from offshore landed in the state, and the new employment attracted to the state by offshore activity. The primary use of formula grants is for planning and to alleviate damage caused to environmental or recreational areas. Revenues allocated through the formula grants may also be used as a secondary source of funds if CEIP Fund allocations for project assistance are exhausted.

The primary use of the CEIP Fund of $800 million is for project-type assistance. There is a formula allocation based on the costs of providing public services and anticipated population increases due to energy facility activity, but the allocation is simply the maximum a state may apply for on a project-by-project basis. The major stated intention for the CEIP Fund is to provide loans and loan guarantees for the financing of public investments, and occasionally public services, prior to accrual of associated revenues from energy facility development. The provision of loans and loan guarantees takes care of the front-end financing problem associated with energy facility development.

The risk element of public facility development is also explicity provided for by making forgiveness of any loan, or payoffs associated with loan guarantees, automatic if revenues anticipated to be associated with the energy facility do not materialize. The law stipulates that each project for which an application for assistance is made must include forecasts of population change, the costs of public facilities, and the revenues to be anticipated. It is clear that, whenever anticipated revenues are sufficient to repay the loan, either a loan or loan guarantee is virtually automatic under the CEIP Program.

Less clear in the law itself is the treatment of the spatial mismatch problem. It is implied that local governments which do not anticipate receipts to exceed costs should be aided, but it is also clear that funds for public facilities must be provided through loans or loan guarantees rather than grants. Only if revenues are then insufficient to retire the loan do grants for repayment assistance become available. An area that is somewhat vague in the law is the administrator's discretion to grant loans when revenues to retire the loan cannot be forecast. It should be noted, however, that project-related assistance is flexible enough to deal with any kind of local government unit, a flexibility necessary because of the large number of local governments with diverse functions in different areas.

The law is not a simple one, but it is directly aimed at achieving specific objectives and is probably about as simple a law as could be anticipated to achieve desired results. If there is any source of confusion, it is in the creation of two separate funds to accomplish four different purposes, with one fund allocated on a formula grant basis for a restricted

list of activities and the other mainly for specific project-related assistance up to a maximum amount for each state, also calculated by formula.

The other potential weakness in the law is in the treatment of local governments. The law simply states that "each coastal state shall, to the maximum extent practical, provide that financial assistance provided under this section be apportioned, allocated, and granted to units of local government within such state on a basis which is proportional to the extent to which such units need such assistance" (Section 308 (g) (2)). Furthermore, the degree of federal supervision of whatever process is developed is limited to review following the process — not the results. Given the diversity in local governments, such an approach may be all that is possible, but it is not one that many local government officials feel comfortable with.

Coastal Energy Impact Program Regulations[7]

Any law must work through regulations and administrative procedures. The development of regulations for the CEIP has been controversial. The controversy stems from several dilemmas. First, the strategy adopted for drafting the regulations was to be sure that restrictions, statements of administrator discretion, and controversial points were placed in the first drafts so that state and local officials would have an opportunity to comment prior to the publication of final regulations. This approach was considered superior to that of publishing brief and vague initial regulations for comment and then putting all the restrictions in the final regulations — when it was too late for comments and revisions. While the approach taken may have produced the desired results, it caused considerable controversy for program administrators and provided opportunities for advocates of pure shared revenues — who disliked the attempts to limit windfalls — to try to shape the program to fit their preferences or force a rewriting of the law itself. Most of these attempts were so obvious as to lose credibility and did not have a major impact on the final regulations.[8]

A second dilemma was the simple trade-off between administrator discretion and certainty for state and local government officials, complicated by the difficulty of actually forecasting the fiscal impacts of energy facilities on a local government. In some areas administrator discretion was reduced in subsequent drafts of the regulations. For example, the automatic nature of repayment assistance when revenues to repay loans did materialize was clarified. However, in other areas administrator discretion had to be increased because rules developed to account for each potential local government situation would have been so complex that no one could have understood them. The increase in administrator discretion was in the most critical project evaluation area — that of deciding on the "quality" of forecasts of fiscal impacts, the repayment terms for loans, and what conditions should accompany loans when revenues for repayment cannot be forecast. This is likely to be the most critical area, because if there is no spatial mismatch almost any forecasting technique will predict adequate revenues to repay loans and sufficient revenues will be collected for this purpose. However, when repayment is so assured, it is better for the local government to borrow through the municipal bond market or use a state-sponsored borrowing program whose interest rates will be lower than those on CEIP loans or CEIP loan guarantees, which eliminate the tax-exempt status of municipal bonds and, hence, charge higher interest rates. It is precisely the marginal cases in which forecasts are uncertain or in which revenues are unlikely to be generated that a local government would have to use CEIP borrowing if it were to obtain funds at all. And it is precisely here where administrator discretion remains paramount.

A serious attempt was made, in the preliminary regulations, to reduce administrator discretion in this area by specifying the components of a simple fiscal forecasting model

developed specifically for CEIP purposes.[9] The model would have required historical data on revenues, expenditures, and population changes for the previous ten years and then, utilizing existing tax rates, would forecast population, revenues, and expenditures under the impact of the energy facility. A maximum amount of the difference between revenues and expenditures would have been specified in the regulations for the payback schedule, and, if it were verified that revenues would in fact be insufficient to cover costs, a payback schedule could be designed in anticipation of repayment assistance. The entire purpose of this process was to reduce the discretion of the administrator and provide local government officials with a simple tool for forecasting energy facility impacts. Instead, several local government officials responded to the proposed regulations by indicating that such forecasts were too costly and required too much data. Hence, specific forecasting requirements were eliminated from the regulations, and forecasts and payback schedules were to be negotiated on a case-by-case basis. Thus, a major effort to reduce administrator discretion and provide a certain position from which local government officials could begin their negotiations was eliminated at the request of the local officials.

Another reason, beyond the costs of implementation, for not relying on specific energy facility impact forecasts is that small area fiscal impact forecasting simply is not a well-tested art. In spite of hundreds of thousands of dollars spent by NSF and the Bureau of Land Management on energy impact forecasting procedures, none of the procedures can be disaggregated down to the local community level.[10] Thus, the procedure developed for the CEIP was unique, and it would certainly have been desirable to have the method tested prior to using it as a basis for writing financial contracts.

Another area where administrator discretion was expanded, in response to oversight hearing criticism, was in the granting to local governments of loans for which repayment cannot be forecast. The law seems to indicate that such governments should receive aid, but the focus on loans instead of grants for public facilities makes it unclear what the administrator's position should be when repayment cannot be anticipated. The program administrator has specifically testified that loans will be available to impacted local governments even if repayment cannot be forecast.[11] In these cases, a deferred repayment plan will be negotiated with repayment assistance automatically available when necessary. Because of the potential for the spatial mismatch problem, this area of discretion is one of the most important in the administration of the entire program.

The Results

The CEIP is in place and operating. Not surprisingly, states have shown the most interest in grants for "planning," as the product is somewhat unclear and the funds do not have to be paid back. My preliminary assessment is that the CEIP as a law and set of regulations — especially with careful administration of the spatial mismatch problem — fits the problems of front-end financing, risk, and the potential for negative fiscal impacts due to spatial mismatches quite well *if* state and local governments work out among themselves adequate allocation procedures. It is not a simple program, but no simpler program is likely to fit the problem as well as the current one does without generating huge windfalls.

Conclusions

The development of the CEIP in response to the national objective of removing disincentives for energy facility location provides several lessons for the design of federal grants and other programs in coastal areas. First, because of the diversity of the state and especially local government structure, functions, and finance, a set of rules that would really reduce administrator discretion would be so complex that no local government offi-

cial (or most congressmen) could understand them. This dilemma is being increasingly recognized in other areas as well.[12] Second, even though the conceptual framework to reduce disincentives to energy facility location is very simple, a complex program is required to implement the concepts, and the program includes extensive administrative discretion at critical points. Furthermore, even this much complexity may be too much for some local officials, who will prefer to seek a share of the formula grants but ignore the loan and loan guarantee programs.

Third, while the CEIP law and regulations limit windfalls from the distribution of federal funds or federally collected royalties, windfalls from coastal energy facility development are still very likely. As the OTA-sponsored study indicates, there are likely to be large revenues accruing from the onshore components of offshore development. With the spatial mismatch problem, it is quite likely that some local jurisdictions will receive tremendous windfalls (Calvert County in Maryland, for example, has gone from being one of the poorest counties in property tax base per capita to one of the richest because of the Calvert Cliffs Nuclear generating plant) while adjacent jurisdictions are receiving CEIP assistance. This kind of mismatch, however, is the province of state government and state constitutions, and the federal government has no authority to force changes to resolve this issue.

Finally, what do we need to monitor to see if the CEIP is working? One critical area is the state's development of pass through procedures for formula grant and CEIP allotments. No matter how carefully the federal government structures and administers the program, it success also depends on state cooperation. As in any federal system, the details of this cooperation cannot be specified by the national government.

In this analysis I have focused only on the fiscal impact aspects of coastal energy developments. Other aspects of energy development impacts and the CEIP, and its relationship to coastal zone management, are also important, but they are areas where it is more difficult to specify the nature of a problem and a programmatic response. Whether or not programs for such complex problems can be designed at the national level and have as much chance of being successful as the CEIP fiscal impact program does remain to be seen. It is clear, however, that programs with objectives more complicated than those of the CEIP may be difficult, if not impossible, to draft into law and into regulations without almost exclusive reliance on administrator discretion, and a consequent unpredictability of program results for both Congress and affected parties.

Notes

1. *Benefits and Costs to State and Local Governments in Texas Resulting from Off-Shore Petroleum Leases on Federal Lands*, Office of the Governor, Austin, Texas, November 14, 1974; and *Off-Shore Revenue Sharing: An Analysis of Off-Shore Operations on Coastal States*, Gulf South Research Institute, Baton Rouge, Louisiana.
2. "Appendix A: Other Fiscal Impact Studies," in Robert L. Bish, "Fiscal Effects of OCS Oil and Gas Development and Deepwater Port Development," *Coastal Effects of Off-Shore Energy Systems*, Vol. II: *Working Papers*, United States Congress, Office of Technology Assessment, November 1976.
3. Bish, "Fiscal Effects of OCS Oil and Gas Development and Deepwater Port Development."
4. U.S. House of Representatives, Subcommittee on Oceanography of the Committee on Merchant Marine and Fisheries, *Hearings on Bills to Amend the Coastal Zone Management Act of 1972* (U.S. Government Printing Office, 1975), p. 54. Louisiana has a special reason for favoring shared revenues or formula grants over project grants to remove disincentives to new energy facilities. Louisiana already has a developed structure for oil production both onshore and offshore. As onshore production declines, onshore workers and facilities will simply shift to offshore production and few new facilities will be required. A sharing of royalties instead of project assistance would make more fiscal difference to Louisiana than any other state.
5. Jeffrey Roughgarden and Gerald Sauer, "Comparisons of Alternative Methods for Distributing Coastal Energy Impact Funds," Appendix 5 in U.S. Senate Committee on Commerce and the National Ocean Policy Study, *Energy Facility Siting in Coastal Areas* (U.S. Government Printing Office, 1975), pp. 121-126.
6. *Coastal Zone Management Act Amendments of 1976*, P.L. 94-370, Section 308.

7. Department of Commerce, NOAA, "Coastal Energy Impact Program: Proposed Regulations for Financial Assistance to Coastal States," *Federal Register Part II*, Friday, October 22, 1976; Idem., "Coastal Energy Impact Program: Interim-Final Regulations for Financial Assistance to Coastal States," *Federal Register Part III*, Wednesday, January 5, 1977; and Idem., "Coastal Energy Impact Program: Administrative Procedures," *Federal Register Part IV*, Thursday, February 23, 1978. There were also at least three unpublished drafts of regulations that were circulated to Congress and state and local public officials, but the three published versions permit analysis of changes and responses to comments from one draft to another.
8. Hearings before the Subcommittee on Oceanography of the Committee on Merchant Marine and Fisheries, House of Representatives, 94-2, *Oversight on Regulations Being Proposed by the Office of Coastal Zone Management for Implementation of the Coastal Zone Management Act Amendments*, December 10, 1976.
9. Robert L. Bish, John D. Wolken, Candis L. Brown, and OCZM Staff, *The CEIP Impact Model: Technical Assistance Materials*; Robert L. Bish, John D. Wolken, *The CEIP Impact Model Technical Manual*; and Robert L. Bish and Candis L. Brown, *Issues in Energy Facility Impact Forecasting*. All prepared for the Office of Coastal Zone Management, NOAA, Contract No. 7-35174, 1977.
10. The Weston Corporation has completed a detailed assessment of energy impact forecasting procedures under contract to the National Science Foundation, and those reports are in the process of being published. Some of their conclusions are summarized in Bish and Brown, *Issues in Energy Facility Impact Forecasting*.
11. *Oversight Hearings*, p. 31.
12. Robert D. Reischauer, "Governmental Diversity: Bane of the Grants Strategy in the United States," in Wallace B. Oates, *Political Economy of Fiscal Federalism* (Heath Publishers, 1977), pp. 121-122.

Some Political Realities of National Ocean Policy-Making

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When Tim Hennessey and I first talked about jurisdictional complexity in ocean policy-making, I was reminded of a classic example from nearly 40 years ago. In a note to his budget chief, President Roosevelt made the kind of jurisdictional decision that only presidents can make. He wrote:

> I agree with the Secretary of the Interior. Please have it carried out so that fur bearing animals remain in the Department of the Interior. You might find out if any Alaska bears are still supervised by (a) War Department, (b) Department of Agriculture, (c) Department of Commerce. They have all had jurisdiction over Alaska bears in the past and many embarrassing situations have been created by the mating of a bear belonging to one Department with a bear belonging to another Department.
>
> F.D.R.
>
> P.S. I don't think the Navy is involved but it may be. Check the Coast Guard. You never can tell![1]

Of course more recent Administrations have displayed a much greater seriousness of purpose toward problems of organization and jurisdiction. I'm not sure the outcomes have necessarily been any better. But for two oceans in particular the obsession with organization has obscured a number of fundamental aspects of politics, power, and position.[2] These features are hardly new or original. For political scientists, they are fixed in the process of American politics; for political practitioners, they are forces to be reckoned with. Yet I think they bear repeating, if only to remind ourselves of their reality. So in the time remaining, I would like first to describe the notion of a policy arena, then relate that to the fragile triangle that links ocean interest groups, congressional committees, and the executive bureaucracy in ocean affairs.

The Oceans Policy Arena

Policy arena is just a shorthand way of describing a more or less identifiable area of political activity. Typically, it involves readily identifiable clusters of policy concerns, reasonably well-organized interest groups. These groups have regular contacts with executive and congressional groups with jurisdiction over their affairs; rarely are they actively involved in other policy arenas. As a distinctive policy arena, ocean affairs are at a primitive stage in their evolution. The historical reasons are obvious.

Historically, ocean policies have emerged to meet specific needs. These ranged from naval defense, safe navigation, collection of customs, support for the maritime and fishing industries, port and harbor development, to protection of the marine environment. These activities are all linked by a common kinship to the sea. But they remain distinct functional problems that simply have not provided powerful incentives for collective action. There is little sense of common identity between and among the distinctive sectors of ocean users. There are few alliances across these sectors.

The views expressed here are the author's and do not necessarily reflect those of the National Science Foundation.

Most do not even sustain the kind of Washington-based trade and professional associations so common for other established and evolving interests. Cooperative or collaborative lobbying efforts across ocean policy areas is virtually unknown.

In short, the nature of ocean activities is more conducive to fragmentation and isolation than to concentrated efforts to influence the government across the full or even partial range of ocean concerns. This atomized policy arena is especially conducive to jurisdictional complexity, a complexity reflected in the diffusion of power and authority for ocean matters throughout the federal agencies.

Style and Culture in the Federal Ocean Bureaucracy

A feature aggravating the diffusion of power and authority in the oceans arena stems from the culture of an agency, the "internal set of loyalties and values which are likely to guide its actions and influence its policies."[3] It embraces the way in which "shared loyalties and outlook knit together the institutional fabric. They are the foundation of those intangibles which make for institutional morale and pride. Without them, functions could not be decentralized and delegated with the confidence that policies will be administered consistently and uniformly. But because people believe what they are doing is important and the way they have been taught to do it is right, they are slow to accept change."[4] It is that complex of agency origins, practices, and collective political and bureaucratic experience that has shaped the way any agency sees its job, the legitimate scope of its concerns, and the skills and people required to perform its mission.

In terms of government activity, ocean affairs are so new that there has been little chance for a distinctive ocean culture to emerge in those agencies with marine responsibilities. Bear in mind that the National Oceanic and Atmospheric Agency (NOAA) is only eight years old. NOAA itself was the stepchild of the Johnson Administration reorganization establishing the Environmental Science Services Administration by merging the Weather Bureau and the Coast and Geodetic Survey just five years before. It was, and in some respect remains, more a loose confederation of groups involved in environmental research and services than a coherent agency. Moreover, its prospects for evolving a coherent identity as the ocean agency were handicapped at the outset by the decision to keep the Coast Guard and responsibility for coastal zone management out of NOAA. Not surprisingly, these decisions were made in the wake of several bruising jurisdictional battles involving the Departments of Interior and Transportation.

The point is that NOAA, as the most visible of the civilian ocean agencies, has had neither enough time nor enough political support to establish a durable sense of bureaucratic identity and responsibility. It is still heavily populated with veterans from other agencies whose missions — fisheries productivity, coastal mapping, weather forecasting — were fairly narrowly defined in terms of environmental services and research.

Yet within its brief history NOAA has picked up responsibility for the Coastal Zone Management Act of 1972 (and more recently expanded authority under the 1976 amendments), Deepwater Ports Act of 1972, ocean dumping under the Marine Protection, Research and Sanctuaries Act of 1972, Marine Mammal Protection Act, and the Fishery Conservation and Management Act of 1976. All these jobs, with the exception of ocean dumping, are regulatory or developmental rather than research. The most recent jolt to the traditional identity brought into NOAA has been the displacement of an earlier generation of scientific managers by a new hierarchy of lawyers.

This lack of history and associated lack of strong institutional identity, and absence of a solid, loyal constituency, have made NOAA not only a target for the buccaneers in other agencies, but also a rather awkward partici-

pant in expansionist politics. This was painfully exhibited earlier this year during Senate hearings on United States policy toward Antarctic resources.

NOAA's former Assistant Administrator for Ocean Management, Paul Leventhal, stressed NOAA's mission as the lead agency for conservation and management of marine living resources and the relationship of this role to NOAA's role in Antarctic resource issues. In describing various NOAA research activities on the subcontinent, he referred only once to NSF, noting that "in all of these projects NOAA has acted in close cooperation with the National Science Foundation, the lead agency for coordination of the Antarctic scientific research program."

In the extensive questioning that followed, Senator Pell asked whether NSF or NOAA had primary responsibility for scientific research in the Antarctic. Leventhal explained that, overall, NSF was responsible but that the NOAA role was likely to increase with greater focus on living resources and the applied sciences. When asked by Senator Pell about the portion of the NOAA budget going to Antarctic research, he estimated it at about $200,000, an amount Senator Pell calculated to equal roughly 0.02 percent of NOAA's budget. In contrast, NSF spent about $55 million, or about five percent of its funds, in this part of the world.

The point is that NOAA, as the nation's lead agency for the oceans, had neither the established role, the political support, nor a powerful clientele to enable it to assert such territorial claims, even over a much less politically significant player like the National Science Foundation.

Let's take another look at bureaucratic culture and style, in this case that of the National Science Foundation. NSF has had over 25 years to establish and legitimize its identification with academic scientific research. One aspect of this identity is a vague distaste for politics. One consequence is the sublimation of political self-interest, a lack of interest and enthusiasm for politics, for the trade-off and compromises inherent in the political process. Brain workers — scientists and educators in particular — are often afflicted with this attitude. Because NSF is heavily staffed with these kinds of professionals, it is hardly surprising that the Foundation is markedly nonacquisitive or expansionist with respect to new or old missions of other agencies. That is, unless one of these missions threatens to intrude directly into that narrow spectrum the Foundation regards as its own preserve.

One recent example involves the imminent assignment to NOAA of the National Ocean Pollution Research, Development, and Monitoring Planning Act. Anticipating final passage of the bill, NOAA scientists began to draft working papers to carry out the new assignment. NSF specialists in marine chemistry felt the draft proposals might have some merit. They were, however, concerned that "the autonomy of the two major agencies supporting basic research in the marine sciences (NSF and ONR) will be placed in jeopardy if the subject document is allowed to become final without major alteration." They were mainly worried about the confusion of basic research and pollution studies and about "this lack of precision in a matter that could have dire consequences for autonomous support of basic marine environmental research by special agencies." The response, however, was based primarily on professional concerns about the nature of basic research, not frustrated territorial imperatives to capture the marine pollution research as part of its mission.

A final point worth noting is the place of ocean affairs in the overall context of agency missions. Typically, ocean affairs are subsumed as part of some overall functional area. For example, oceanographic research constitutes only a portion of the National Science Foundation's responsibilities. The same is true for most other agencies, including the Army Corps of Engineers, the Environmental Protection Agency, and the Departments of State, Energy, and Interior. The ocean programs in these agencies have not de-

veloped into independent centers of political strength.

Let me give an example close to home. The International Decade of Ocean Exploration has received gratifying support from outside the National Science Foundation. This has come from influential groups like the National Advisory Committee on Oceans and Atmosphere (NACOA), the trade press, and even on occasion from an errant oceanographer. But we've never felt we have received the support or recognition within the Foundation commensurate to that we sensed from outside. This lack of support has been a source of some disappointment. Still, it is perfectly understandable, given the larger concerns and constituencies of the Foundation. Oceanography is only one small part of the range of science and research institutions for which the Foundation is responsible. Moreover, it has sought to fulfill these responsibilities within the confines of a virtually level budget for nearly the entire history of the IDOE program. I'm sure this situation is no less true for other ocean programs within larger departments. Sea Grant has certainly experienced these constraints within NOAA. Probably even NOAA has been subjected to these limitations within the overall Department of Commerce budgets.

Congress

Another key contributor to the diffusion of power and responsibility in ocean affairs is the Congress. In 1975 the General Accounting Office, at the behest of the Senate's National Ocean Policy Study, released a report describing the number of ocean programs throughout the executive branch. In what has become a familiar litany, it observed that "the United States has no comprehensive national ocean program. Federal marine science and other oceanic activities are conducted by 21 organizations in 6 departments and 5 agencies. Necessarily, many of the activities of these organizations are closely related."[5] When pressed a bit, one of the authors of that report readily admitted that the real responsibility for the proliferation rested squarely with the Congress. This was not, of course, mentioned in the report.

But this is no surprise even to casual students of Congress. Congressmen represent diverse constituencies; each is sensitive to a powerful variety of political, social, and economic interests; and each is confronted with an enormous workload, some 25,000 bills introduced into each two-year session. One answer has been to divide the work among committees and subcommittees of varying degrees of interest, power, and attraction to the members. Those committees with highly specialized concerns, like the House Committee on Merchant Marine and Fisheries or Post Office and Civil Service, hold little interest for most members. Compare these to prestigious committees like Ways and Means Committees, or the Senate Finance or Foreign Relations Committees.

The importance of the congressional committee structure is that this structure is itself a greater force for fragmentation than consolidation, particularly in generic areas like oceans or energy. If there is to be any major centralization in the administrative organization of our national ocean affairs it must be preceded by some rather significant changes in the organization of the Congress. And these changes come hard. The House committee structure has not been significantly changed since 1946.

The intensity with which the committees protect their jurisdictions was reaffirmed in early 1973 when the House set up the Select Committee on Committees. Its job was to conduct a thorough review of all aspects of committee structure — size, budgets, staffing practices. Congressman Frank Horton, in testimony before the committee, allowed as how he didn't envy the committee's "far-reaching and complicated responsibility." He went on to say that "committee and sub-committee chairmen jealous of their prerogatives, and a vast interrelated constituency of government departments and agencies, special interests, and individual citizens, are unsympathetically

awaiting any bill, resolution, or other action with respect to any matters covered by their resolution that you report to the House."[6]

Horton knew whereof he spoke. Jurisdictional specialization is the rule rather than the exception. Congress has done little to reorganize jurisdictions to give coherent attention to broad national problems like energy or the oceans. For example, 18 different committees deal with educational matters; over 30 subcommittees in both branches of Congress have jurisdiction over some aspect of ocean affairs.

The Select Committee came back with a report calling for reassignment of jurisdiction of a number of key committees, wiping out two long-standing committees — including Merchant Marine and Fisheries — and splitting another in half. The House Democratic caucus effectively killed the proposal by sending it back "for further study." Few were willing to jeopardize the already delicate distribution of power within the committees.

The implications of these jurisdictional preserves in the congressional committee structure is that they invariably affect not only the substance of legislation, but its assignment in the executive branch. As Seidman notes:

> Existing arrangements result from compromises and historical accidents, not from conscious organizational philosophy or planning to achieve identified purposes. Committee jurisdictions reflect a series of pragmatic decisions designed mainly to provide an acceptable division of the workload and to secure committee assignments which enhance an individual member's ability to represent and serve his constituency.[7]

There have been numerous examples from the oceans area. In 1965, for example, President Johnson merged the Weather Bureau and the Coast and Geodetic Survey to create the Environmental Science Services Administration. The Weather Bureau reports to the House Interstate and Foreign Commerce Committee, the Coast Survey to the Merchant Marine and Fisheries Committee. Because neither committee was willing to cede its oversight authority, the new ESSA came under the simultaneous oversight of two substantive House committees. Despite this unusual executive-legislative arrangement, it does not appear that the fortunes of the new agency were harmed.[8]

Another example comes from the legislation setting up the Sea Grant Program. Because the authorizing legislation from the Senate involved a charge to the National Science Foundation to administer a program of grants to academic institutions for research, education, and advisory services in marine resources, it was assigned to the House Education and Labor Committee. In a move to capture jurisdiction over the nascent program, the House Merchant Marine and Fisheries Committee introduced its own bill. This move, which ultimately succeeded, brought the program under the general policy guidance of the National Council on Marine Resources and Engineering Development. The upshot was that the policy arm of the National Science Foundation, the National Science Board, was compelled to share responsibility and oversight over one of its grant programs with an outside group designated by Congress.

A more recent example took place this past April. House Merchant Marine and Fishery Committee Chairman Murphy and Oceanography Subcommittee Chairman Breux introduced a separate bill to authorize funding for NSF's Ocean Sciences Division and for the Deep Sea Drilling Project. The amounts were identical to those requested in the Foundation's fiscal year 1979 budget request, which was already under consideration by the Congress.

This move, though a bit unorthodox, was simply one means for asserting the committee's jurisdictional claims over all oceanographic research, a jurisdiction expanded and specified in one of those few reforms that were accepted by the House in 1973. Until this time, however, the committee had respected the jurisdiction of the House Science and Technology Committee over all NSF programs and had not sought to exercise its prerogatives with respect to NSF's ocean programs.

On its face, the committee effort was potentially beneficial to the Foundation's ocean science program. In fact, it had the effect of

creating a degree of ambiguity and uncertainty for relations with NSF's primary committee, the House Committee on Science and Technology. This put Foundation managers in the awkward position of reassuring its parent committee that it was not flirting with a budgetary end-run, while at the same time expressing cautious appreciation for the efforts of its newfound friends in the Oceanography Subcommittee.

Final Observations

The simple premise of my remarks has been that there are very good historical, structural, and political reasons for the jurisdictional complexities that pervade our national ocean policy-making process. These include the specialized nature of most ocean activities; the newness of ocean affairs on the national political agenda; the atomistic character of the ocean policy arena; the lack of time (and relative tranquillity) to evolve an "ocean culture" within the agencies of government; and the increasing specialization and fragmentation of the congressional committee structure.

More fundamentally, the problem which seems to obsess the Administration, the reorganizing for ocean affairs, rests not with the Congress or the agencies but with the complexity of ocean problems themselves. In short, the oceans do not provide a useful or a coherent organizing notion for an area of national policy. Ocean problems are too varied, too diffuse, and their contributions to the national wealth too varied and erratic to constitute the base for a "national ocean policy." Ocean issues cross so many lines, involve so many potentially conflicting interests, that simple organizational remedies are rarely appropriate to resolve them.

But rather than launching the second decade of ocean rhetoric, let me close by recalling for you some rather insightful comments ascribed to a Greek sailor writing 2,000 years ago. Commenting on the nature and consequences of organization, he wrote:

> We trained hard but it seemed that every time we were beginning to form up into teams, we would be reorganized. I was to learn later in life that we tend to meet any new situation by reorganizing; and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency and demoralization.

The failure to acknowledge the fundamental truth of these observations by the Administration has had the effect of trivializing the current discussion by focusing on structures rather than substance. Lacking a vision of the nation's ocean future, and a powerful commitment on the part of the President to realize this vision by dealing with the political realities of the existing distribution of power and influence, all the current talk about organization and reorganization is bound to come to little or nothing.

Notes

1. Memorandum to the Director of the Bureau of the Budget, July 20, 1939.
2. This overview draws heavily on Harold Seidman, *Politics, Position and Power: The Dynamics of Federal Organization*, 2nd ed. (New York: Oxford University Press, 1975).
3. Seidman, *Politics, Position and Power*, p. 18.
4. *Ibid.*, pp. 18-19.
5. *The Need for a National Ocean Program and Plan.* Report to the Congress by the Comptroller General of the United States, October 10, 1975 (GGD-75-97), p. 1.
6. House Select Committee on Committees, *Hearings*, May - June 1973, Vol. I, Part I (May 1973), p. 173.
7. Seidman, *Politics, Position and Power*, p. 66.
8. Robert B. Abel, "The Politics of Executive-Legislative Relationships in a Multiple Committee-Single Bureau Situation," unpublished Ph.D. Dissertation (The American University, April 1972).

An Ecology of Governments: Marine Policy in a Federal System

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A number of major policy issues facing the United States are marine-related and a good many of them are located within the nation's coastal zone. Energy facility siting, competing recreational, commercial, and residential land and water uses, and environmental protection are but a few of the matters which are now commonly discussed as problems of coastal zone management.

One of the initial responses to the recognition that a number of public policy questions concerned the allocation of coastal resources was to produce a label for a process which, if properly applied, was expected to resolve the biological, economic, and social conflicts associated with the use of the narrow strip of land and water that encircles much of the nation. Thus, coastal zone management was "invented" no more than a decade ago. Subsequent efforts to implement and operate such management systems provide a vehicle for considering the jurisdictional complexity of formulating only one aspect of marine policy for the United States.

There is wide agreement that coastal areas are a valuable resource and that a public interest must be reflected in their allocation and use, but there is no consensus on what mix of uses and users is most appropriate. It is also accepted that government action will be the mechanism for protecting the public interest, but there is considerably less agreement on the form of intervention and the type and scale — national, state, local, or intermediate — of government that should decide on and administer coastal management policy. However, we may be close to a premature closure on these issues which places control over coastal development in large-scale regulatory systems prior to an adequate understanding of the possible effects of such change on the allocation of resources or on the federal system itself.

In the early 1970s three states, California, Delaware, and Washington, on their own initiative, created quite different state-wide management structures for regulating aspects of land and water use in their coastal areas. These were quickly followed by the Federal Coastal Zone Act of 1972, which gave a national priority to states adopting coastal management systems based on federal criteria. The fiscal incentives provided in the act and subsequent amendments have induced all coastal states to undertake at least the planning of coastal management systems. Another of the incentives for state action is the "federal consistency" provision of the act. In exchange for adopting coastal regulations which reflect the "national interest," federal agencies are to become subject to state coastal policies once the state's overall plan has been approved by the Office of Coastal Zone Management.

These national efforts to introduce greater symmetry into state and federal relations in allocating coastal resources also have third-party effects. To satisfy federal requirements

for funding, states are expected to enter into land-use policy areas which traditionally have been controlled by local government. In a sense, the broadening of federal influence over coastal development is based on the transfer of authority over land and water uses from cities and counties to the state.

Underlying these policies is the belief that public problems are best solved by transferring decision-making powers from smaller- to larger-scale organizations. The resulting proposals for structural change, however, are normally based on a number of uncritically accepted assumptions, often implicit, concerning the benefits of large-scale organization in policy formulation and administration, our capacity to simplify complex political systems and the consequences of doing so, and the belief that federal actions necessarily reflect the national interest. A closer look at recent efforts to modify the distribution of governmental authority and influence in the allocation of coastal resources will allow an elaboration of these points.

Governing the Coastal Zone

Decisions concerning the use of coastal resources are now made or influenced by a complex ecology of governments with a variety of units in terms of scale, organizational type, and mission. Coastal cities and counties exercise considerable control over their shorelands. Independent authorities, such as port districts, may exist for limited functional purposes. State and federal agencies produce some goods and services, such as water-oriented parks and recreation, harbor improvements, and marine rescue services. The major influence of state and federal policies in the coastal zone, however, is through the regulation of the activities of others in both the public and private sectors and by providing incentives for specific actions by other governmental units with grants and other types of funding.

In the Los Angeles area, for example, the following governmental units exercise authority over portions of the coastal zone: numerous city governments, Los Angeles County, a regional and state coastal commission, the Southern California Association of Governments, the Metropolitan Water District, a county flood control district, the South Coastal Air Quality District, a regional water quality control board, and the California Energy Commission, not to mention the state legislature. Among the relevant federal agencies are the Bureau of Land Management, the Coast Guard, the Environmental Protection Agency, the Fish and Wildlife Service, the Department of Housing and Urban Development, the Corps of Engineers, the Maritime Administration, the Department of Defense, the Heritage Conservation and Recreation Service, the Federal Power Commission, the Nuclear Regulatory Commission, and the Office of Coastal Zone Management.

Even this lengthy list does not exhaust the formal administrative structure or the larger system affecting resource allocation, of which it is a part. Policy is mediated through parallel and interacting processes. Administrative and regulatory agencies are ultimately responsible to elected officials and potentially susceptible to the influence of the voter. Further, bargaining among public agencies is an important means of resolving policy conflict. At the same time, many direct allocation decisions are made through market transactions in the private sector. The pricing system plays a major part in determining what use will be made of particular parts of the coastal zone and who will have access to the market. Finally, adjudication in state and federal courts often has a dominant role in creating policies and making specific allocative decisions which are binding upon public agencies as well as private citizens and firms.

The output of this complex system is, in the minds of many, unacceptable, because it fails to give adequate weight to environmental values. This "breakdown" in the public sector is usually attributed to the existence of too many government units with control over segments of the coastal zone. Some, such as local

governments, are seen as being organized on too small a scale. However, even at the state and federal levels, there are too many agencies dealing with aspects of the coast that have overlapping and sometimes conflicting responsibilities. This mode of analysis typically results in calls for new and larger-scale agencies that will have special and clearcut powers to manage the coastal area. Simplification by reducing the number of autonomous and semi-autonomous components and transferring controls to large-scale organizations to better reflect regional, state, or national interests has been a key factor in proposals by coastal zone management advocates.

These policy recommendations contain two ironies. One is that groups concerned with energy production and supply are making similar arguments for state, if not federal, control over all energy facility siting decisions in the coastal zone. The existing system, with multiple decision points, is seen as allowing local governments to place environmental values above energy production in their priorities. It is believed that environmental values can be more predictably subordinated to energy production if decisions are made at the state or national levels. This issue will be considered in more detail below.

The second irony concerns the contrasting assumptions that environmentalists tend to make about human and nonhuman ecological systems. Exactly the opposite analysis is made for marine ecological systems than is made for the management and policy systems that are called for to protect the former. A major concern about the coastal environment is that the actions of people are endangering ecosystems by making them more fragile, unstable, and vulnerable through eliminating components, interfering with processes, and simplifying their structure. A biologist will seldom be willing to support actions that would substantially change the habitat of a major specie of marine life without some understanding of how the ecosystem will be affected. Proposals to change and simplify the processes by which we make and administer policies for coastal resource utilization should involve a similar caution.

In human social, economic, and political systems, productivity, cultural achievement, and the generation and utilization of knowledge all tend to be related to systemic complexity. This analogy suggests that actions to reduce the complexity of public sector systems should be made only with an understanding of how the present allocative processes function and with the aim of preserving the beneficial aspects of complexity. Two examples can be used to pursue this issue: one is related to the initial experience with a state coastal zone management system in Los Angeles County; the other concerns the role of local and state governments in the siting of energy facilities in the coastal zone.

Centralizing Urban Coastal Decision-Making

California has been in the forefront of both coastal resource exploitation and regulation. In 1972 the voters of the state enacted the most comprehensive and centralized coastal management system yet adopted. It transferred ultimate authority over a thousand yards inland from the mean high tide mark, from cities and counties to the regional and state level. In the electoral campaign for Initiative 20, two themes received heavy emphasis. One focused on the charge that great amounts of rural and underdeveloped, as well as urban, shoreline were being transformed to uses that were unacceptable in ecological or aesthetic terms or that reduced public access. The second theme dealt with the causes of this misallocation of coastal resources. Decisions made by cities and counties about coastal development were seen as a primary source of the problem. A basic premise of the legislation was that local governments had been failures in protecting the public interest in the coastal zone and must give way to decision-makers who had a broader perspective. Consequently, the shift of final authority over coastal development to a larger-scale system was the solution.

In the logic of this view, implicitly at least, local governments constitute a homogeneous set. What can be said about one can be said about any other, in the sense that all city and county officials are susceptible to market pressures for developing coastal land to its highest economic use. Alternatively, if communities respond to locally determined priorities, they tend to be narrow and in conflict with the broader interests of the region or state.

These themes constitute what can be called a "breakdown model" of the public sector at the local level and have been central to the rhetoric of supporters of statewide coastal management systems, not only in California but throughout the country. One of the cognitive effects of this model has been to orient the design of new coastal regulation to the protection of nonurban areas and to make little differentiation among local governments in terms of their effects upon coastal resources or utilization needs. Equally important, the possibility of unanticipated or negative effects growing out of efforts to simplify and reduce the complexity of government within urban regions is not recognized.

Unsurprisingly, the 1972 legislation paid little attention to the question of how to meet the socio-economic and environmental preferences of subsets of the population in urban areas of one, two, five, or ten million or more people and reconcile them with each other and state or national interests. This law, which literally removed final control over their shorelines from cities and counties, was enacted on the basis of little knowledge of the actual behavior of local governments in large urban centers and how they varied from each other and from those in less developed areas.

This gap between the assumptions in the breakdown model upon which Initiative 20 was based and actual knowledge of the existing allocative system in a metropolitan complex led to a study designed to explore an alternative set of behavioral assumptions. In reference to Los Angeles County, it was postulated that city and county governments may have the capacity and, in fact, frequently do consciously adopt values concerning their coastlines that mediate market forces and result in heterogeneous sets of uses that clearly distinguish one portion of the metropolitan area from another. Through their political processes, local governments may be viewed as mechanisms for allowing diverse preferences within and among communities in the same region, to be translated into discrete public and private goods and services in the coastal zone. Further, it was hypothesized that legislation which seeks to simplify the policy formulation structure of a region without fully understanding the functions of the preexisting allocative system can have effects on communities that are unanticipated, not uniform, and dysfunctional for the community and region as a whole. The study utilized records of development permit actions in Los Angeles County, taken between 1973 and 1975 by a two-county regional coastal commission, as well as historical data on the ways in which nine cities and the county government typically allowed their coastlines to develop prior to the new law.

The results offered little support for the breakdown model as an accurate means of describing the performance of the region. An exceedingly complex and spatially differentiated set of uses existed along the metropolitan coast in 1973, when Proposition 20 was implemented. They could not be explained as the outcomes of unregulated market forces or community decision-makers seeking only short-term, narrowly local benefits. Rather, they reflect the interplay among market pressures, regional demands for coastal-related public goods and services, and community preferences articulated through local political processes. The resulting policies ranged from well-defined positions for or against intensive or extensive development to total indifference. Some policies had remained stable for decades, others had changed at various times or were in transition.

An analysis of the permits issued by the regional commission indicated that few marked changes occurred in previously estab-

lished mixes of housing and commercial and industrial activity within communities. However, the impacts of the law upon each city and the county were far from uniform in maintaining their preferred coastal resource utilization patterns. They varied with the amount of each community's land area and resources that were within the regulated zone, the type of policy followed locally, the extent to which the subarea's image was associated with its coastal location and its ability to wield political power in the region.

The law represented an attempt to replace one allocative system with another, without fully understanding either what was being foregone or the equity issues that would arise in relation to its differing impacts. The recognition of the importance of local governments in articulating subregional preferences and evaluating the effects of alternative-use patterns does not mean that all locally preferred policies must prevail. Rather, it suggests that coastal policy formulation in highly urbanized areas may be a problem of resolving differences and establishing cooperative interaction among *competent* publics of differing scale — local, regional, and state — rather than one of simply overcoming opposition to the transfer of control upward.

One unique aspect of Proposition 20 was its self-liquidating provision, specifying that it should not extend beyond five years. As a result, the position of local government was substantially strengthened in the California Coastal Act of 1976. This occurred, however, only after intense conflict in the legislature over the role of local government, which is now directly involved in coastal planning and the issuance of permits subject to criteria and guidelines established by the legislature and a statewide commission.

Energy Siting Policy and Local Government

The issue of siting energy facilities is currently the most visible and volatile question concerning the coastal zone. It has produced arguments about scale parallel to those offered for statewide coastal management systems. The assertion is made that a reduction in the complexity of and number of participants in energy facilities siting decisions will enhance efficiency, equity, and the national interest in the provision of energy. However, this transfer of authority is urged with the expectation that it will result in a subordination of environmental values to those of energy production. Even so, questions similar to those arising out of the discussion of the effects of change in governmental structure above are also pertinent here. In addition, the implications of the scale debate about energy for federalism in its present three-tiered form — national, state, and local — are much more evident.

An almost unanimous view exists among national officials that there is a critical need to increase both domestic production of energy from new sources, particularly through outer continental shelf (OCS) development, and importation of fuels in the short run. Enthusiasm for the aspects of such a policy, which will require more facilities for energy production, processing, and distribution in the coastal zone, has not been equally shared by leaders at the local, as well as some state, levels.

Imperial Federalism

A decision was made in the mid-1970s to accelerate, as a matter of national policy, the development of oil and gas resources presumed to exist on the OCS. Considerable controversy was generated by the policy's potential onshore, as well as offshore, environmental and socio-economic impacts. Most substantive questions were argued in terms of the roles that the federal and state governments should play in regulating OCS development. Federal dominance was established over decisions on site leasing and offshore exploration and production. This resolution also had the effect of excluding cities and counties from standing in such decisions, even though the offshore policy choices will have significant influence over the location, type, and intensity

of the onshore support systems required. This was true even though most communities will have considerable influence over such support facilities through their land-use and related powers. Moreover, federal and many state officials have proceeded to formulate OCS-related policies without providing a role for local governments in planning for onshore facilities, and, to a large degree, federal agencies directly involved with OCS policy are not fully reconciled to even a consultative role for the states.

This behavior on the part of national administrators has not grown out of a lack of awareness on their part that state and local governments in frontier areas have constitutionally derived authority that gives them a major role in the creation and operation of onshore support systems or that there will be substantial effects, both positive and negative, upon communities. Local governments, particularly, have been treated as a residual category in the federal system for energy policy. As such, communities have been presumed to be amenable to externally defined priorities and capable and willing — or can be made so —to establish and manage the infrastructure needed for energy supply expansion and to accept facility siting decisions dictated by the policy choices of national and corporate agencies.

Underlying this attitude toward subnational governments is what can be called a perspective of "imperial federalism." It involves the assumption that an understanding or agreement reached by or with decision-makers at a higher level of the federal system can be ascribed to all lower components. This belief has produced a view that things can be done *to* or *for* rather than *with* states and, particularly, local communities as federal preferences dictate in the area of energy policy. This frame of mind has resulted in a number of "surprises" for both federal agencies and energy firms in terms of the behavior of subnational units toward their energy siting proposals.

Obtaining approval from the Bureau of Land Management for offshore drilling, for instance, does not guarantee approval of onshore support facilities. A case in point is the failure of the California Coastal Conservation Commission and Exxon in 1976 to reach agreement on the specifications for onshore pipelines for new oil and gas production off Santa Barbara. Neither does strong political backing from state officials for the construction of a coastal refinery insure acceptance by the local community that has control over land use at the desired site. The widely celebrated victory of Durham, New Hampshire, in preventing Aristotle Onassis' Olympia Oil Refineries, Inc., from locating a facility there is only one of a number of such incidents. A review of ten refineries that were planned but not constructed on the East Coast in the past decade shows that one-half of these projects were blocked by local government or community group action.

Negative Feedback and a Federal Response

The resistance of local governments and groups to energy facilities has normally been treated as a series of ad hoc events. As a result, there has been little systematic analysis of such behavior. In fact, it constitutes a recurring and often successful phenomenon which may mean more than a few communities capriciously opposing the national interest.

Typically in such cases, the local communities were the last to know about the siting plans of energy firms or of other energy-related proposals. They were informed only when some formal action by the municipal or county government was required and after substantial corporate commitment had been made to the location, often with prior consultation with state or federal officials. This pattern has been a powerful incentive for social learning on the part of local groups that are opposed to or ambiguous about energy facilities.

Local strategic behavior of several kinds has resulted. One is to take pre-emptive action. The courts provide one such avenue,

which was used by Suffolk County, New York, in an effort to prevent lease Sale No. 40 in the Mid-Atlantic area. While the validation of the lease sale and the start of exploratory drilling were only delayed, the action in the courts did force, for the first time, the inclusion in the national dialogue of a number of issues concerning the role and interests of local governments in OCS development. Four counties in southern New Jersey have formed a Coastal Counties Offshore Development Committee which has been active in monitoring and opposing aspects of several energy-related projects, including OCS development and floating nuclear power plants off Atlantic City.

Cities and counties also can create a negative climate by making it clear to energy firms that they would not welcome any or certain types of facilities. Even if this fails, intensive local opposition, as noted above, can stymie an external decision to site energy facilities.

This is not to say that all communities oppose all energy facilities or do so successfully. Many are bidding eagerly for them. Rather, it reflects the fact that the national policymakers' image of local governments as tractable has frequently proven wrong. More serious, however, is that the response of officials has not been to conclude that too little knowledge exists about local behavior, preferences, and on-site information about facility impacts, or that too little attention has been given to decision and planning procedures that can adequately reflect legitimate local interests. More typically, the response has been to assume that local governments can be made supportive or, at least, neutral toward energy facilities by showering upon communities federally generated, although not necessarily usable, data and money or loans (at very poor interest rates). At the state level, the carrot of federal consistency is held out for a commitment from state governments to conform to the national interest, which, in this case, would undoubtedly mean a willingness to facilitate siting decisions which grow out of negotiations between federal agencies and energy firms. A more radical response has been support for the transfer of all such decisions in the public sector to the states or federal government.

The Scale of Decision-Making and the National Interest

It is clear that many communities and some states are opposed to, or will critically evaluate, proposals for new energy facilities. The action may be based on economic, environmental, or community revitalization goals or safety factors, among others. Such behavior hardly satisfies the national interest if it is primarily defined in terms of increased energy supply. If this criterion is followed, we are being asked to modify significant aspects of the distribution of power within the federal system to satisfy energy supply-related goals.

In a way this response is analogous to cutting off the head of the bearer of bad news rather than dealing with the problems that the unfortunate messenger reports. Large-scale and hierarchically structured organizations, including federal agencies, are notorious for their motivation and their ability to reject negative feedback. Eliminating the ability of localities to exercise vetoes over externally made siting decisions, in combination with the expectation that coastal states will accede to the national interest as defined at the federal level, will seriously reduce the likelihood that all effects of such decisions will be identified and evaluated. Conflict would not end but be transformed into contests between large-scale environmental groups and federal agencies and energy firms. Further, the distribution of governing authority among the national, state, and local levels involves unique balancing issues.

It is a dangerous assumption that the national interest will always be better reflected by transferring authority from smaller- to larger-scale systems, especially if no attention is given to establishing means by which the preferences and knowledge of subsets can be articulated and given standing in the larger system's decision processes. Attempts to simplify deliberately the structure of policy for-

mulation can have costs in the performance of the overall system which are greater than the benefits, because of the complexity and redundancy produced by multiple decision points.

Going back to the parallel between marine ecosystems and political systems, perhaps the proponents of proposals which would seriously modify the existing structure of government and distribution of authority within the federal system should be required to file a governmental impact statement. The G.I.S. would analyze, for example, the effects of regional coastal management agencies or the transfer of control over energy siting decisions upon the capacity of cities and counties to provide their residents with mechanisms for exercising control over the state of affairs of the community. If the impact is negative, how will it be costed out? If a choice is made to implement the change, how can provision be made for substitute means of representation for the interests of people most immediately affected by the siting decision? Will local officials directly participate in some larger decision-making body? Or will they have only standing to formally comment on proposals in what becomes a process of interest group politics? Who will have standing to negotiate the local conditions of siting energy facilities with the firms or utilities involved?

At the same time, the G.I.S. should consider the probability that the goals of the proposed change will be achieved. In reality, the ratio of one to the other has not been high. Efforts to internalize the management of all coastal resources into a single state or regional agency, for example, will necessarily fail, even though this goal is common in the rhetoric of coastal zone management advocates. Such a unit not only will be one of several with public regulatory responsibility for the resources but it will also have to function as part of a larger system which includes political, judicial, and market processes. Whatever its goals, a coastal management system must either account for or modify these factors to achieve any degree of success.

It should be made clear that it is not argued in this paper that the federal system is or can be made static or that national, state, and local roles and powers will not or should not change over time. Rather, the point is that if we are making proposals to affect marine policy with the direct intent or indirect consequence of affecting significantly the existing distribution of governmental authority, we must be aware of it and understand what is being foregone and how we wish to compensate for it. Similarly, we must have a better knowledge of the probability of success of the proposal.

Discussion

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I was intrigued by these three papers. I liked Bob Warren's comparison of the federal structure to a pond community of organisms, each eating the other in achieving a state of balance, and I think it may be a useful thing to keep in mind in Washington. I was encouraged by Bob Bish who — I think, correctly — described the complexities of the Coastal Energy Impact Program, but felt that we were probably doing as well as anybody could with it, although perhaps not very well. It was a good description of the real difficulties that we've encountered. And Lorry King is certainly right about the difficulty of establishing an ocean identity. We've gone through that in NOAA, and I think it's like sitting on a glacier — from the top you don't notice much movement, but if you come back every few years you see little differences, a few icebergs have fallen off.

I think we have made some progress, and let me give you a most significant example. We have a very lovely NOAA seal with Jonathan Seagull on it. When I first came to NOAA at the end of 1973, I noticed that it wasn't on our stationery, and suggested to Bob White, then Administrator, that we ought to have it on our stationery, and he said, "Yes, but the Department won't let us." So, we negotiated over a period of time, and finally we were told we could put it on the stationery as long as the Commerce seal was on it too and as long as the words "Department of Commerce" were in bigger letters than "NOAA." Now, I just took out my calling card, and I see that the Department of Commerce seal has disappeared, and "Department of Commerce" is in smaller letters than "NOAA," so progress is being made after all.

The thoughts that I have concerning these papers turn around the question of how you put the decision-maker in the best position to make a rational decision in the area of marine policy. I am making the perhaps simplistic assumption that one should try to have a single locus for decisions, so that the responsibility for both decision and performance can be located in a single place, and that someone, usually Congress, is charged with judging whether the task is being well carried out.

I am interested primarily in the vertical problem. Of course, we do have the turf problem constantly with us, which is the problem of the horizontal jurisdiction. There is, for example, the matter of sea turtles. Under the Endangered Species Act, we are responsible for animals that swim in the ocean; Interior is responsible for those that walk on land. The sea turtle is very troublesome, because at certain times of the year it comes out of the water to lay its eggs. We talked for two years with the Department of Interior about this problem, and finally arrived at the statesmanlike solution that Commerce would have jurisdiction over the turtle when he was in the water, and Interior would have jurisdiction when he was on land. In the ocean you have some very interesting jurisdiction problems. On land, jurisdictional complexity arises from

the fact that you may have several agencies with power over a particular geographical area. In the ocean, while the jurisdictional scope of an agency or a government is usually limited geographically, it is the problem that crosses the boundaries, whether it be marine pollution or marine fisheries or other marine problems.

It is in the legislative process that there is an opportunity for rational consideration of the organization problem, and some sort of considered decision on how it can best be solved. Resolution of these issues does not depend entirely on bureaucratic turf fights or legislative trade-offs. Members of Congress, once they have their immediate political problems out of the way, are really interested in setting up a mechanism that works.

Committee and subcommittee hearings offer one opportunity. Another notable occasion is during the conference committee proceedings, assuming there are House and Senate bills which are different. There some very intense negotiation goes on; the staff has a big input, the executive agencies have their input, and they really do try to address the problem of how to make it work.

The Fishery Conservation Act is a good example of this process. At the time that it was enacted, we gave a lot of thought as to how it ought to be set up, whether these powers ought to go to the states or to the federal government, or to this new device, the Regional Fisheries Management Council. The Council won out — I think, wisely. Fish don't recognize jurisdictional boundaries very well, and so the jurisdiction of the regional councils follows the habitat of particular species and types of oceanic fishes. It was a bold, new thing to do, and while we have had our troubles in implementing it, most of the system is working, and I am very encouraged for the future. When you look at a problem such as the regulation of fisheries, you must decide what kind of an allocation of, or change in, the vertical decision-making power will be required, particularly among the federal government, the states, and the localities.

There may be a number of reasons why the old system isn't working. Maybe the problem has just gotten too big for the existing mechanisms, or maybe a national policy has come into being which must be implemented on a national scale.

There are also temporal considerations. Perhaps the problem is outrunning the ability of the existing institutions to deal with it, even though, given plenty of time, they could handle it. Energy is one problem like that. Environmental problems are another. We are destroying our marine environment, such as our wetlands, faster than the existing institutions can act to prevent it. Another temporal problem is the problem of individuals who are suffering hardship because they have to deal over a period of years with numerous agencies to get an answer to legitimate requests. It is possible to move the problem in the vertical structure to a place where they can get an answer more quickly from a single source.

Finally, you may find that the technology needed to deal with a problem exceeds the resources of the smaller organizations. A large technical structure may be required just to understand the problem and cope with it on a responsible basis.

In other words, you try to fit the focus of decision somewhere in the vertical structure at a point which best fits the problem. The trend lately has been to move many points of decision back to the states, some down from the federal level, and some from the local level. I think it is a healthy trend. After all, the states were the original building blocks for our federal structure. We sometimes forget that all the residual powers of the government are in the states. We may also forget that the local jurisdictions are nothing but creatures of the states, and vary widely from little towns in New England that have 1,000 acres and 1,000 people, to enormous governmental units like New York City and Los Angeles County. There's nothing magical about them, you just look for the right place to put the decision power.

In the FCMA, the decision-making power

is shared between the regional councils, largely state bodies, and the federal government. Decision-making under the Coastal Zone Management Act is largely in the states; and under the Federal Water Pollution Control Act it is shared by the states and the federal government, with standard-setting responsibility in the federal government. There are substantial state inputs in the Deepwater Ports Act, and in the OCS Lands Act amendments now before the Congress.

In the Marine Mammal Protection Act, which is one of the types of acts that I mentioned in which there is a consensus on national policy, practically all of the powers are in the federal government. The states may only implement federal policy. The policy is very clear as to what we should be doing with marine mammals, but the states don't all share that policy — and the state, in particular, that has 95 percent of the marine mammals doesn't share it. And so we've been negotiating for about two years with Alaska, under the provisions of the act, with a view to turning over enforcement of the act to state authorities. It's a difficult problem, because basically, as long as the stock is protected, they see these animals as a resource to be used, both for sport and as a food supply. But the national policy is somewhat different under the act and you can see the problems that introduces.

Once you have made a decision as to the locus of power and put it into practice, how do you know whether you have made a wise choice? I have four standards that I use. The first is whether or not the organization in which you placed it in the vertical structure has the capacity to develop and to elucidate the scientific or factual background of the problem at the beginning for all interested people. This is very important, and I must say that in NOAA we have often been remiss. Unless you get out to your constituencies, unless your scientists are credible and your fact finders in the agency are credible, you are in trouble right from the beginning. In the Fishery Conservation and Management Act, for example, one of our big problems is that, while we have good fishery scientists, they have not been able to get out and really communicate what they're doing to the fishermen. You must describe the problem, convey the seriousness of it, and state honestly what you know and do not know about it.

A second standard that I use is whether the organization you've selected is able to collect and digest the opinions of all these complex constituent groups, and then has the flexibility to adopt good suggestions; in other words, to come up with something that combines the knowledge you have — and, to some extent, your own discretion and judgment — with the views of all the interested parties. Someone this morning mentioned our public participation program in NOAA. The idea is to make it possible for people who represent diverse points of view to attend our administrative hearings or otherwise participate in the administrative process and to express their points of view. They may be on the West Coast; they may not have a lot of money — in that case, we might pay their fare. They may not have a lawyer. We might pay their lawyer's fee. Nothing very big, but just enough to make the difference between not having somebody represented and having them there in an administrative proceeding.

A third test that I think is important is whether the decision-making process is really an open one, open in the sense that you know who is talking to the decision-maker and you know the grounds on which he has made a decision. Now some of this is required by case law and by statute, but people do it in different ways, and I think it important that the spirit as well as the letter be observed. And finally, and this is something that NOAA is now realizing, it isn't enough just to make the right decision; you must be able to enforce it. Other agencies in the federal and state governments learned a long time ago that enforcement must in the long run be based on acceptance. You can go to Alaska and persuade the Eskimos to help you enforce the rules on bowhead, if they are fair rules, but I doubt if enforcement would otherwise be possible.

Biliana Cicin-Sain

Political Science, University of California at Santa Barbara

I think all the speakers have done an excellent job of depicting different aspects of the complexity of our federal system. King's paper has shown very well the diversity and jurisdictional complexity prevalent at the national level, and has vividly described the fragmentation of authority and jurisdiction in congressional committees, in the executive agencies, and among the interest groups. Bish has taken a different cut and has looked at complexity in a vertical sense, describing the complexities associated with the design of federal regulations which must take into account the peculiarities of the more than 80,000 units of local government that may be potential grant recipients. And Warren has further elaborated on this complexity and has raised some very important questions. He has introduced a cautionary note about federal preemption in this area, and has warned us to consider very closely the question of which level of government is best suited to addressing particular problems or to performing particular functions.

What I would like to do first is to elaborate briefly on the concept of jurisdictional complexity by making reference to the fisheries area and to the Fishery Conservation and Management Act (FCMA) of 1976, and then I want to address some of the theoretical issues posed by Warren.

For the past two years, I have been studying the implementation of the Fishery Conservation and Management Act of 1976 with particular reference to the Pacific Coast and to the salmon fisheries. I think that jurisdictional complexity in the marine policy area can be particularly aptly highlighted in the context of the salmon fisheries. Let me just tell you the number of different agencies at different levels of government which are involved in managing that particular fishery. First of all, there is the international level, which these gentlemen really did not focus on, but, of course, it's a very relevant part of the decision-making environment for marine affairs. At the *international* level, you have several agencies within the Department of State which bear on salmon management, then you have bilateral agreements, multilateral agreements, and you also have to worry about Law of the Sea considerations.

In terms of *domestic federal* agencies, you have approximately 33 different bureaus (lodged in seven different departments, and in a number of autonomous agencies) that deal with some aspect of salmon management, be it habitat protection, resource allocation, administration, economic development, or what have you.

At the *state* level, there are over 40 agencies/commissions in the four states — California, Idaho, Washington, and Oregon — which are concerned with different aspects of salmon management. At the *regional* level, in addition to the main actor, which is the Regional Fishery Management Council, there are seven other regional entities which range from the interstate marine commissions to tribal associations.

At the *local* level, you have at least 20 different local governments, in different ports in the four states, dealing with some aspect of salmon management. And we didn't even attempt to count all of the interest groups; considering only the interest groups that have presented testimony at regional council meetings, we have a total of 50. Thus, I think that the jurisdictional complexities inherent in managing salmon vividly illustrate the points made by the panelists in their respective papers.

The point that I want to stress, though, is that diversity, interjurisdictional complexity, jurisdictional turf-fighting, administrative discretion, and all the things that these gentle-

men have talked about are really nothing new in our federal system. We have always had diversity and conflict among different levels of government. As a matter of fact, these things are just endemic to or inherent in our federal system of government. Moreover, our system of federalism is a highly fluid one. Relationships among the different levels of government vary considerably over time. Which level is dominant at any point has a lot to do with the kind of political climate which prevails at the time. Certainly in the urban area, for example, we know that we are now favoring the localities, whereas a decade ago the federal government was in control. So the point is that these things are very fluid and that they shift over time.

I think that what really differentiates the marine area from other policy areas in terms of federalism are two factors: (1) the rapid rate by which government regulation in this area has increased, and (2) the scope of the regulatory systems that are being established. Laws such as the Fishery Conservation and Management Act of 1976 are, in a sense, establishing a whole new system of government, a brand new approach to federalism, and a whole new structure of regulation. The expanded rate and scope of change create both new difficulties and new possibilities. In regard to difficulties, agencies and other actors must learn to cope with a great deal of uncertainty and ambiguity. In a climate of rapid change, agencies must learn to perform new roles and to deal with new partners. NOAA, for example, as King points out, is in a transition stage, changing from an agency basically concerned with biological preservation and with the provision of services to an agency which must be concerned with management of the entire human ecosystem in the marine area.

Agencies also have to learn to deal and to coordinate with new partners to which they are not accustomed; in many cases, they have to find out who those new partners are, and they have to establish new relationships with them. Agencies also have to deal with new political groups that have become mobilized as a result of the increased pace of government regulation. In terms of fisheries, for example, many new fishermen's organizations have been formed all over the country in response to the FCMA. Agencies, in short, must learn to operate in a very fluid kind of learning environment, one in which many organizational adaptations will have to take place, both in intraorganizational and in intergovernmental terms.

While the complexities surrounding this climate of change will no doubt pose problems for the agencies and bureaucratic actors involved in this process, these changes, at the same time, mark the possibility of attaining new and creative forms of federalism. The FCMA, again, is a case in point. Administratively, the regional system established under the FCMA is a highly unusual one — without ready analogue in other policy areas. It is a regional system empowered to make plans for fishery management, without, however, final approval authority or enforcement powers. While an autonomous system, it is also dependent for expertise, staff resources, and budgets on, among others, NMFS (both regional and national), the Department of Transportation (Coast Guard), the Department of State, state departments of fish and game, interstate marine fishery commissions, scientific and statistical committees, and on contracting services. It is also a part-time system, with most of its members performing other roles and having different organizational or professional allegiances/reference groups. The novel organizational structure and processes mandated by the FCMA are thus resulting in new patterns of interorganizational and intergovernmental conflict and cooperation. A new pattern of federalism is emerging. To what extent it will prove successful and effective, we don't know yet; the empirical evidence is not yet in.

In the developing and fluid federalism which characterizes much of the marine area, there is really no universal answer to the question of which level of government is best

suited to maximizing particular interests or considerations. I think that in other policy areas (and let me again refer to the urban one), we have a long history and a substantial body of data on these questions. We know what tends to happen at the regional level, what happens at the local level, what happens at the national level — that is, what interests get maximized at different levels. If you represented a poverty group, for example, and asked me where I thought you should concentrate your lobbying efforts, having good historical data over time on this question, I could tell you exactly at which level you should concentrate your energy.

The marine area, on the other hand, is more complicated and it really varies. Most of the new laws and regulations in this area incorporate multiple and often conflicting objectives. Let me take the FCMA again as an example. One can invoke the FCMA to pursue all kinds of different goals. The FCMA is aimed at resource conservation, at economic development, at the maximization of nutritional value to the nation; it can also be invoked to preserve a certain kind of independent lifestyle and to preserve employment opportunities (including the availability of part-time employment opportunities). Now, it's obvious that a lot of these goals or objectives can conflict with one another, and I think what we're tending to see is that we're getting different resolutions of this conflict at different levels of government. So, when in fisheries management we call for "optimum yield," I think one of the things we have to realize is that a regional optimum — the kind of management solution that is reached at the regional level — may be very different from a national optimum. At the regional level I think we will tend to see that we will maximize employment opportunities and the interests of the fishermen and of coastal communities; perhaps at the national level we will tend to maximize the conservation aspects and the nutritional value aspects. The point is, though, that each level may be best equipped to respond to particular constituencies and interests, and it's only after all the decisions at different levels have been put together that we can ultimately attain an "optimum yield" for the nation as a whole.

Another point is that we're finding that some conflicts over competing uses of the marine environment cannot be resolved at the local level or at the regional level. Again, let me give you fisheries as a case in point. Fisheries form part of a broader marine habitat in which other interests are active competitors. Some of those interests are marine transportation, navigation, critical habitat protection, marine mammal protection, mining, logging, road construction, gravel extraction, use of herbicides for agricultural purposes, recreation, aesthetic enjoyment, etc. While the regional councils constantly have to deal with the interaction between fisheries and these other uses of the marine habitat, the conflicts that arise cannot really be solved at the regional or local level, because these other interests are being regulated or governed by multiple agencies at the national level and they also have national constituencies. Some of these conflicts will ultimately have to be resolved, I think, through interagency bargaining at the national level.

I have two final points to make. Because the new systems of interaction that we're witnessing are largely unpredictable, I think that what we really have to do in this area is to establish mechanisms for evaluating the extent to which these new laws are being implemented or not, the extent to which they're reaching their *intended* effects, and also the extent to which *unintended* effects may be occurring. The lesson that unintended effects do often occur is something that we learned in other domestic policy areas a long time ago (at least ten years ago), but it seems to me that in the marine policy area, this notion has not yet taken root. We need to establish better monitoring systems and baseline data so that over time we will actually be able to tell the extent to which these new laws are meeting their objectives. In this regard,

Warren suggests that we establish a government impact statement. I think that's not a bad idea, but I would be against it because we are already finding that NEPA reviews (at least in the fisheries area) entail a tremendous amount of delay in the management process, and they are not really very useful, because the socio-economic data found in the reviews generally tend to be rather poor. I should mention in passing that in the urban area we have just instituted an urban impact statement process. What I fear, with these proliferating impact statements, is that all we may be doing is setting up new bureaucracies and new jobs for us social scientists — which may not be too bad, but, after all, we are living in an age of tight fiscal constraints.

In conclusion, I wholeheartedly agree with King when he says that "if we are to create a comprehensive policy, a comprehensive ocean policy, we need to have some vision of where we want to go, of what the future of the oceans should be, and we have to have some idea of how we want to get there." I think that if we lack such a vision, the process of coming up with a comprehensive policy solution will inevitably always be fragmented and disjointed and turf-dominated. Let me again give you an urban example. This past year I was involved in the formulation of a comprehensive urban policy, and that experience convinced me that President Carter is very wrong when he thinks that comprehensive policy solutions will result merely by activating an interagency coordinating mechanism — which is what he did in the urban area. Without a sense of direction, without a sense of vision, without a sense of policy — i.e., where do we want to go, what do we want for our cities, what do we want for our oceans — there will be no comprehensive policies. The kinds of jurisdictional problems, turf problems, that King has described so well I think will impede the development of any kind of comprehensive solutions.

Douglas L. Brooks

Executive Director, National Advisory Committee on Oceans and Atmosphere

I'd like to start by making very brief comments about Warren's paper and Bish's paper, and then turn to Lorry King's paper and take up where I think he left off, if I may be presumptuous. I think what I have to say about Warren's paper has already been said by both Biliana and Bill. I think that it's proper to be cautious, as Warren advised us to be, about the assumption that the larger the scale of the authority involved, the better the job it can do. Certainly the federal role is not to force blind compliance with whatever regulations it decides, on whatever basis, to come up with, but, as has been said by both the other discussants, I don't think that's really saying enough, and certainly it is not enough to talk about federal imperialism or imperial federalism — I can't remember which it was. I don't think there is a conspiracy to bring everything to the federal level, and I really think there is a valid point in deciding that the scale of the authority must relate to the scale of the problem. I agree with the examples given. I think the Fishery Conservation and Management Act with its regional councils is appropriate to the scale of the fisheries management problems within the 200-mile zone, and I remember, and John Knauss will probably remember also, that one of the basic arguments behind the Stratton Commission's proposal for a national coastal zone management approval was that there were broad-scale system problems such as urban waste management, which had to be planned on a scale that went far beyond the

scope of local waste treatment planners, and port systems, which really deserved eventually to be planned and managed as a system on at least a regional basis and not just on a one-at-a-time basis.

I think — to add one other dimension to this question of deciding at what level to assign the authority for various kinds of decisions — it depends to some extent on the nature of the decision itself. A government does more than merely regulate. In fact, it regulates for more than one purpose. A government regulates to protect the environment, of course; that's very much on our minds these days. It also regulates, however, in order to preserve — that is, conserve — resources which would otherwise be exploited at too great or unwise a rate. And in the ocean and coastal area it certainly regulates for mutual compatability of potentially conflicting uses. So regulation itself has many aspects. Government these days also has a role in promoting the development of resources. It also has a role in monitoring and providing services that would facilitate the safe and effective operations of activities — in our case, marine activities — and I suppose research, not just for research sake but for improving the effectiveness of operations in the private sector as well as in government itself.

I think we do come, as Biliana suggested, very much to the question of new forms of federalism, innovations in the government process; and certainly the Coastal Zone Management Program is one of those innovative forms of federalism. But I'd like to call to the attention of the political scientists in this group, particularly our speakers, some of the unmet needs for innovative forms of management, forms of authority. One has to do with managing the multiple uses of the 200-mile exclusive resources zone, not just for fisheries but for all the other activities that are beginning to be built up and become convergent in that area. Bill Garther, Warren's colleague at the University of Delaware, has a concept which would turn the management of at least the Middle Atlantic economic zone over to a consortium of sorts which would support itself by exploiting resources of the zone. Now, I'm not advocating that, but I'm just suggesting that there is a need for innovative approaches to the relationship between authority in the role of government and the need of industry to be active and involved in resource development. And one that is very much on my mind these days and on the minds of many people in the ocean business, is an approach that would be better than the one proposed for the international management of the resources referred to as the common heritage of mankind — namely, the deep seabed minerals. The proposal of the present United Nations Conference on Law of the Sea for the creation of a deep seabed authority — and a deep seabed enterprise which would be operated and run by the authority — essentially as a monopoly to manage the resources of the deep seabed. The proposal in its present form is probably not a very feasible or desirable solution, and I would commend to the attention of the political scientists the task of designing a better management system at the international level, where U.S. interests are very much engaged and very much in jeopardy at this particular point.

To turn to Dr. Bish's paper, I felt it was a very interesting analysis of where the process of providing for the adverse fiscal impact of offshore oil development breaks down. It breaks down, he says, on the basis of the diversity of the need and, therefore, in the complexity of the regulatory process, and it breaks down because of technical deficiencies, particularly in forecasting the fiscal impacts. The consequence which he deplores is that the authorities who have responsibility for making decisions in this area have to use their discretion. But, as Biliana said, this has been with us since the beginning, and I don't think that there's any way of eliminating the responsibility of decision-makers in government to exercise wisdom and their own set of values, and to use their discretion in pursuit of what they see as the objectives of the exercise

in which they have responsibility. So I think we're stuck with a need for administrative discretion, and, really, I think this is what representative government is all about. I hope we'll never get to where we have government by computer or by referendum, such as the Californians have recently experimented with, because I don't think that the consequences would be very good decisions. I would point out that the personal qualifications of the decision-makers, either elected or appointed, are a very important factor, and the technical or legal process is not everything. The substance of the decision is, and therefore the qualifications of the people who have to be involved in the process and use their discretion are very important.

Let me now turn to Lorry King's paper. As I see it, he's addressing himself to the constraints on the federal ocean policy-making process. I think he's quite right in identifying the three major ones as: (1) the fact that there's little sense of unity among the diverse ocean interests; (2) the fact that there's cultural lag and bureaucratic inertia as well as the tradition of competitive bureaucratic power drive in the federal agencies; and (3) the fact that in Congress the committee structure and, hence, the power structure tend to preserve the status quo.

Having said all this and diagnosed the malaise, I think it would be interesting if we could speculate for a minute about what to do. Can we do anything? Is there something that may change this in the future and give us some hope that this situation will not persist forever? Lorry suggested that a sense of vision of what the ocean's future could be would be helpful, and that a Presidential commitment would be helpful also. I agree with both those observations, but in addition there are forces, it seems to me, that it is worthwhile to identify at this point, because if we can align ourselves with them they may help change the situation. For example, I think there is a new sense of growing crisis among many of the ocean interests. I think there is considerable alarm among the marine commercial interests in this country over what's happening at the United Nations Conference on Law of the Sea, whether it results in a treaty or whether it merely results in a changed attitude and general acceptance of new customary rules of operating at sea.

The monopoly that's being contemplated for managing the minerals of the deep seabed would obviously be controlled by the Third World. Although I think that the Third World, of course, should share in the common heritage, so should the developed world. This arrangement starts with manganese nodules in the deep seabed but covers whatever else of value may turn up. Secondly, I think that many people have been disappointed, some even shocked, by the fact that U.S. policy seems to be relatively passive and has accepted rather too easily the position of the lesser-developed countries, which would impose rather rigorous consent requirements for distantwater research cruises. The scientific community, I think, is disappointed that the U.S. negotiators have not been very aggressive about this feature of the comprehensive treaty. And I think that this may add up in some people's minds to a revelation that the State Department is probably unsuited temperamentally — as well as inadequate in manpower — to be the sole agent at the federal level to promote U.S. marine interests abroad. Essentially their stock-in-trade is negotiation, but the policy and the objectives for which they're negotiating really ought to come from a more aggressive recognition of the interests that are being negotiated.

To turn to domestic decision-making and the decision-making process, I think many of the marine constituents are concerned about the delay and the lack of accountability in helping industry move out to sea. I mean OCS oil and gas in the so-called frontier areas has been a very long time coming. Offshore facilities and structures — such as offshore power plants, deep-sea tanker moorings, and so on — have had a very long, sad history of trying to struggle through the regulatory process. And then, just to balance the picture, I think there's

considerable uneasiness among the general public about who's looking after the public, especially, about making sure that the fisheries resources in this case are being conserved as well as pursued, that recreation, which is of great interest to the public, is being maintained against counterpressures for use of beaches, and that pollution control is really pollution control and not just some sort of a charade.

I think the constituencies may begin to rise up, and we may begin to see something along the lines of what Bob Knecht called a "bottom-up emergence of concerns, rather than the top-down declaration of national policy with everything else following dejectedly." I think this is a possibility. There is some political flexibility in Congress. The House Merchant Marine and Fisheries Committee, for example, is relatively well set up for oversight of a full range of ocean affairs. NOPS, the National Ocean Policy Study, in the Senate, which most of you are familiar with, still has some standing and it still involves some powerful individuals, such as Senator Magnuson and Senator Hollings. There really does seem to be the need for something that might be called an agent for change. That is, something that would act as a catalyst to get all these things put together and coordinated into some sense. There is a possibility which remains to be seen, that NACOA itself, the National Advisory Committee on Oceans and Atmosphere, may be an appropriate agent to get this sort of process started. For example, it consists of nonfederal Presidential appointees, so they're not bureaucrats. They are drawn from a broad range of ocean and atmospheric interests, so they do represent most of the constituencies. They do not report solely to the President or the Congress, they report to both, so that they do not have the constraint of having to conform to Administration policy or to congressional predispositions. They do have handicaps. It's a part-time activity for the participants. It's understaffed. It's vulnerable to criticisms of bias and superficiality. But in the next couple of days it will meet to review a proposal to try to carry out such an effort. What it is considering is the following: an intensive effort that will start on the 20th and 21st of July with a two-day meeting; will continue with at least one workshop involving not only NACOA but many non-NACOA participants on the 31st of July and the 1st of August; and then will proceed to a three-day pressure-cooker-type workshop on the 18th, 19th, and 20th of September, also with many non-NACOA participants. The objective of this exercise, if the committee agrees to proceed with it, would be a major report on the need for and the basis for federal reorganization for marine and atmospheric affairs, to be submitted to our two clients, the President and the Congress, sometime in the fall, presumably in October. This is what I wanted to focus my remarks on, that I think the committee does feel such an effort is timely and might be successful and that it is considering, and is likely to agree to, making the attempt.

INFORMATION NEEDS FOR DECISION-MAKING

Niels West, *Session Chairman*
Geography and Marine Affairs, University of Rhode Island

Design Concepts for Comprehensive Resource Information Systems

Ernest Hardy

Director, Resource Information Laboratory, Cornell University

Design concepts for resource inventories is a relatively new area which has just gotten underway in the last two years.

When I got a call from Dr. West, I thought to myself, Well, why in the world would he want me to talk to a group of marine scientists? And that raised the question: Why in the world am I here?

Well, things do work out. Even though we in resource inventories haven't been dealing directly with oceanographic problems, everything that we work with does end up in the sea, one way or another, except for these flies. And so maybe there is a good connection in that the things we're working on now are things that become your problems in a few years.

Now, why do we have resource inventories? Some of the first answers are obvious. One is that we want to know what we have in the way of natural resources. Another major one, which is not often thought of, is that we want to generate an accurate baseline of information from which we can measure changes over time.

Although the first use is for the red-hot guy who wants to get out there and build a new highway, or a new housing development, or whatever, the actual major benefit is the time-lapse analysis possibility of keeping the information available over a long period of time.

The next question is: How do you do a resource inventory? This is not at all easy. Large areas are usually involved, frequently states, sometimes whole countries, certainly counties, towns, and villages. They always want to get more done than they can for the amount of money they have, which is natural with all of us. And it's a very hazardous career, because if you make a mistake on a project the size of some of the ones that we attempt, you may have cost your institution your salary for a good many years in the future. That doesn't go over very well, as you all know, I'm sure. So the shortage of dollars is something you have to work with in every case.

And then we have the problem of scarce talent. Those are problems that you can bump into anywhere in any kind of career. There are, however, very few people who have ever undertaken a comprehensive statewide inventory of any kind of natural resources. There is practically no one who has ever done it for a country as a whole. The number of people who do this kind of work for a county or a town is very limited. So the number of people you can turn to for advice based on previous experience is very small.

It's very easy to oversimplify the basic concepts of resource inventories. However, they are basically information from any source, no matter what it is — ground surveys, air photos, satellite imagery — and put it through any process. That means that we're not locked into computers. Computers are not always the answer to natural resource inventories. If you do this kind of work properly,

and you do it with an unbiased arrangement, then you should be able to produce information for any user.

The test of a really good resource inventory is when two political sides get going on a hot issue, like the location of a power plant, and they can both come to us and use our information for the argument that they want to prepare. Then we have guaranteed that we have not incorporated biased information into the system. It's not up to us to make a decision. We provide the information, we store the information, we make it available; everybody else is involved with making the decisions. We don't make the decisions for them.

Another major factor of a resource inventory is that it must be repeatable. Most repeat processes are going to be asked for in 5, 10, 15, or 20 years. You have to realize that in that period of time we'll have a different political party, and we will have lost all of the people who worked on the previous inventory. We end up with a genuine problem of learning how to record the information that we should be using in the inventory, and how we record the processes that go into making the first part of the inventory.

The age of the inventory, surprisingly, increases the value. Many times I have had people come to me and say, your information is five years old, and it's out-of-date. The first part of the statement is true; the second part is never true. Inventory information is never out-of-date, because an inventory is prepared as of a certain date. Therefore, even though it was done ten years ago, in 1968 or 1969 or 1970, whatever, there is no way that that information can be considered out-of-date.

So to satisfy these very simple — what at first appear to be simple — requirements, we end up with a list of things that we must know, things that we have to have to work with.

First of all, we must know who the user is. What use is the user going to make of the resource information? We must select appropriate sources of data; it doesn't do any good to use satellite imagery if we can't see the snail data on the satellite imagery.

We must determine the processes to be used. We must have accurate and complete documentation of the technologies developed. We must have a geographic referencing system. And in oceanography that's not so simple. We must have a classification system that is complete. We must have a program to educate the users, even though they are the sponsors and think they know exactly what they're getting. And we need a maintenance system for our inventory. (The previous speaker referred to that; he's fully aware of that, I am sure.) We also need a physical place to store the materials. We don't turn this stuff over to somebody else once we get through making it up. And then, ultimately, we end up with a user service. And we have also heard something about that already.

The user's needs are the first consideration in starting a resource inventory. We don't sit down and dream up what the guy ought to have. We sit and talk with him, for hours on end, and find out what the use is going to be, determine what sources of information are possible that will satisfy his needs, and, then, we proceed from there.

After the dream sequence, as we call it, becomes the reality: How much can he afford in dollars? We usually cut down from the first 500 items he wanted to have inventoried, and it ends up at 55, or 60, or something like that, although we have had a few that have gone as high as 300 items.

Among our sources of data we have land surveys. Of course there are air photos. Always out-of-date, never quite exactly what we would like to have to work with, and always held by a number of different organizations or associations. We often discover that, after we've gone to great lengths to get the tip of Long Island done, say, there's a little company out there flying the tip of Long Island every six months or so, and we would have been three years further ahead if we had known about them.

We work with existing maps and studies, if they are available. Soil surveys are a very

common source of information. We work with remote sensing, if it's useful; it's not always useful. And we work with biological data. You name it, and we can incorporate it into the inventory process itself. In other words, we try to review all potential sources of information for the development of the data.

Then we determine the process, or the appropriate technology, that we want to work with. To do this, we have to convert all of the information that we've gathered to an appropriate scale. We generally end up making maps, of one kind or another, which give us the foundation of our geographic referencing system. Without that, our natural resources, we're kind of stuck. Natural resources have a peculiar problem, in that they can't be moved around. Whereas, if we are working with a small unit that we can actually pick up and move, physically, this isn't so much of a problem.

We determine whether we are going to use manual or computer products, and frequently we want both. We determine, also, whether we can develop a reproducible product system. Do we develop one of a kind, or is it going to be published and printed in volume?

We also look at the problems of high or low mechanization processes. In high mechanization, we can get into automated processing, if we wish. The information that we will get out will have very severe restraints put on it by the capabilities of the machinery. And, unfortunately, a lot of resource information systems are developed within the constraints of the mechanics that they are trying to work with, rather than to meet the needs of the user who is sponsoring the project.

Then we look at the audience that we are going to be serving. Are we serving, as is frequently the case, a few state agency directors, or are we serving the general public, or are we serving an organization — the hunting and fishing clubs, for example?

A major factor, of course, is the scale at which we are going to do the work. A major point to consider here is that a larger scale does not automatically guarantee more information. You can spread the same batch of good or bad information over a large piece of paper, if that's what they want. And they can pay the extra price of having it done. Basically, you increase the price dramatically by going for a larger scale.

A major conflict, if we're using automated processes, is whether we should use rectilinear concepts or curvilinear concepts. One will increase the cost over the other by about ten times. The decision depends on how sophisticated an audience we're serving, how sophisticated the people are who are preparing it, and, how much money they want to spend to get that kind of information out.

The major problem that comes in association with the mapping is the geographic referencing system. This is something that is not always but very frequently overlooked in organizing a resource inventory.

What is the base map we are going to work with, and how are we going to locate ourselves, so that strangers, ten years from now, can come back and know that they found the same 100 acres of land or 100 acres of shorefront? That's not an easy problem.

There are three basic systems that we can rely upon, which are already identified on most USGS-type topographic maps. One is the longitude and latitude system. Those who have worked with this in any large area realize that when you're trying to reduce that down to less than 2 1/2 minutes, it gets awfully messy. There's an awful lot of mathematics involved when you get into minutes, and so forth, of your degrees. Another major problem is that as you go north, surprisingly, the cells that are created by longitude and latitude are never the same size or shape. And, it doesn't matter how far you go: the ones east and west of each other will be same size and shape, but the ones north and south are always different. They come close to being square rectangles at the equator, but in this area and farther north it starts to disintegrate very rapidly. And as you get up into northern Canada, the top of the

map is frequently an inch or so narrower than the bottom of the map. Those are problems that simply do not fit on a computer these days.

We look at another system, the state plane coordinate system, which was designed in the thirties by the Department of Interior for use by land surveyors. This is a 10,000-foot grid system that is established throughout the United States. It also has problems, in that very few people use it. Another problem is that many of the more complex topographic regions have more than one set of baselines. Each state has its own set of baselines, but some states have several sets of baselines. In the case of New York, we have four sets of baselines, one set of which is out in the ocean beyond Long Island. It's awfully hard to convince somebody that you're measuring things concerning his property up in Westchester County based on a theoretical line out in the Atlantic Ocean. One has problems most users find hard to conceive.

There is one system that we do work with a great deal — the universal transverse mercator system. I'll explain what it stands for. Mercator was the early philosopher who worked a great deal with mathematics. He theorized that if you put a grid system around the equator, the young fellows who were learning to be officers on sailing ships could figure out where they were much cheaper and much faster, and that this grid system would work for about 150 miles on either side of the equator. Believe it or not, we used that system in that way for a couple of hundred years. Not too many years ago, someone had the brilliant idea, that if it works at the equator, why don't we turn it transverse to the equator, and it would work anywhere in the world — it would become universal. So universal transverse mercator grid system means it's a 150-mile system, on either side of a baseline, that actually works the whole world over. It doesn't work too well at the poles. But, fortunately, there aren't very many of us working, or living, at the poles. And there aren't too many resources that we are trying to exploit currently near the poles. So we are still getting away with it quite well.

The difficulty is that you have to locate the same places 5, 10, 15, or 20 years later. And to get a grid system that actually works is the major problem we had to solve. The UTM system has been, by far, the most productive one. There are smaller grid systems that work for certain locales. But if you are trying to develop design concepts, then you have great difficulty in satisfying everybody on a worldwide basis.

In locating the same places year after year, we bump into difficulties, as well, with the people who prepare the raw data. With my apologies to those present, I am afraid the biologists fail the test the worst of any group. It's not at all uncommon to read a great bit of work about some field of biology, but when you ask them where the location of their work was, well, it's three miles south of Podunk post office. So you go there, and three miles south of Podunk post office is certainly weird compared to what they described. Then you discover that they had moved Podunk post office two years ago. Ten years from now, there's absolutely no hope whatsoever of finding those locations. So a systematic geographic referencing system is absolutely essential if we are going to maintain these inventory processes over time.

Another major factor is documentation. This also ties right in with the time segment. We want to keep track of how we decided, and why we decided, to do things the way we did. We write down every step of every operation, so that a novice can come in ten years from now and read the instruction book and do the same thing. We want to have a complete history of the project: Who sponsored it; why they wanted it; and so forth. And then all of the details of the technology used: that is, why did we use a clear plastic ruler instead of an opaque one? Well, it's very simple: it's so we can see the complexity of what's under the ruler when we're trying to read things on the maps. These things are essential if we ever want to repeat the operation. The second

purpose of most inventories is to provide a baseline study.

Now, classification is the area that we have had the least cooperation in. Essentially, it's the most theoretical part of the whole operation, and it has had the least attention of any of the major parts of the operation. A classification system for natural resources, or for any area concept inventory, must be comprehensive. We must be able to cover all areas with some form of classification unit. We always have a wastebasket, which is usually titled "Other." Anything that doesn't meet the rest of the descriptive system goes in the wastebasket.

We take time to write good descriptions of the classification units — I mean page after page after page of information about what we're talking about. We don't just say "forest land," or "brush," or "ocean front." We go to that spot. We sit there, and we write, and we make notes for as long as we need to, to be sure we've written enough so that anyone else, not even knowing us, can understand what we're talking about.

If we do a good job of writing our descriptive material, the problem of discrete assignment — that is, mutually exclusive assignment within the classification system — is fairly well solved. If we don't do that, we have the problem of not being able to keep from overlapping classes. And, the problem of not repeating it in the future.

Now a number of difficulties arise with classification systems. The major one is that everything in nature occurs in a continuum; and most things that man does also occur in a continuum. So we end up having to define the parameters on the continuum that we are working with. And also, preferably, the central member.

This is where we bump into the two groups that we refer to as the splitters and the groupies. One group is willing to split everything off, and keep going down to a smaller and smaller pigeonhole. The groupies are willing to say, Well, that isn't going to influence things so very much, so let's work it in with this. We've got to draw a fine line there somewhere and get that straightened out.

The continuum problem can be explained, perhaps, by a very quick illustration. I am sure you all know what a cemetery is. If you were doing a resource inventory, I am sure you are confident that you'd know exactly what to do with cemeteries. They all go in one class called "cemeteries." Then you come up with a historical site on which the body of a person is buried. Is that a cemetery, or is it a historical site? And then you come up with some historical markers. We've got one near my house that says, "A slave burial ground." Is that a cemetery, or isn't it? And, we have Indian burial grounds. Are those cemeteries, or not? And then the one that really gets you; you can now buy a plot for your pet. The interesting thing about cemeteries is that once you buy that plot, it's yours forever. Nobody's going to take it away from you. And the same way with pets. So do we call pet cemeteries "cemeteries," or not? I'll leave that one with you. That's a good brain-teaser. I won't go into that any further. Those are the kinds of things we have to get into our classification. We realize that they are going to be a problem in the future.

Now, we don't have the whole process to cook with, so to speak. One of the tricks of the game is not to give out the information before it's actually ready for use. This has been a problem in the past; there have been projects in which we have had people — speculators, frequently; land speculators, especially — literally looking over our shoulder. They wander into the lab. They just kind of wander around. We ask them what they want. Well, nothing much, and off they go. But don't let the stuff out ahead of time.

This comes to the question of education, storage, and user service. We don't intend to let a resource inventory out to a user without training him or his staff on what's in it and how it works. We have a problem here in that very few users, unless we explain it to them, realize that there is a degree of accuracy to an inventory. And the degree of accuracy prob-

lem comes up in Las Vegas, pretty much. You can take a chance on what you're calling something; if you just flip a coin, it will be 50-50. But if you have an inventory that doesn't give you a lot better than 50 percent accuracy, you've really wasted your money. It's not a very expensive operation to get above 50 percent accuracy. You can go from 50 percent up to 85 or 90 percent quite rapidly, and quite economically. But going from 90 percent accuracy to 100 percent accuracy gets to be horrendously expensive. So we have only a 50 percent range to work with in natural resource inventories. We can improve on guesswork by only 50 percent.

We also have to develop a means of maintaining the inventory. The previous speaker had this problem as well. Once an inventory is established, the next problem is to maintain it. Most frequently the sponsor no longer wants to put money into the system. He says, Well, I got my information. If somebody else wants to maintain it, okay.

Then there is the matter of storage. The major consideration is a need for security — someone who will look after it for 15, 20, 30, 40 years. Should this be a state agency, a special agency, a university, a library-type institution, a paid organization, or a contract approach? The bottom line on that one is that practically all inventories are lost and can never be repeated. This goes for the whole country. We rarely keep our inventory materials more than three, four or five years. The next professor in charge, or the next administrator in charge, says, That was done by Joe Blow, and I am not going to be caught dead hanging onto his stuff. And out it goes.

So one of the things I do in my lab is to make sure that we become a repository. We are always standing there with the door open when someone says, Hey, we want to get rid of this junk. We're willing to take it in and make use of it. These are critically important to the whole organization of things. If we cannot get to the users, and cannot provide a service for them, we've really lost the value of the system. We're not getting the dollar value back out of it that we thought we should in the beginning.

Now, I haven't mentioned machinery. That's something that goes with each process. That's something that goes with the people who are sponsoring it. It's not automatically cheaper to do these things with a computer. In fact, we've got some illustrations of things that are ten times more expensive done by computer than by humans. It's interesting that humans have finally found a place where they are worth something after all, in spite of the computer age.

The above steps — the steps that I've been talking about — meet the demands of the basic concepts. But there's one thing that I will hasten to recognize, and that is that when we're dealing with random areas that might occur on the ocean's surface, we really haven't addressed the problem ourselves. There are, however, two major efforts at the natural level to get involved with locating ourselves on the ocean's surface. When that comes to some form of solution, I think we'll be far ahead of where we are now.

I'd like to do something that no speaker is ever supposed to do. I'd like to flash through a set of slides. I'll talk like a house afire, and let you just visualize these things and see the steps that happen, that I've been discussing with you in the last few minutes.

The first slide is an image of New York state, which has something different in every county. This map was actually made by 50 different people. They were all on my staff. I use it simply to illustrate to you that any piece of real estate means something different to everybody who looks at it. Those in the front row may see some rather X-rated art in the upper right-hand corner here. But, we'll close off that one and go on to the next.

A great variety of resources of information can go into this, all the way from huge maps to single-page units, information from groups of counties, three or four things at a time. Orthophoto maps are a new product that we're able to work with a great deal. We can have high-altitude photography with a ratio of 1 to 80,000, or 1 to 100,000. That one

picture covers, essentially, six topographic quads. But you can get excellent information from it.

This is the Finger Lakes Region, with Ithaca, New York, in the center of the frame. Every shade on that frame — this is satellite imagery from 620 miles in space — is a different kind of land use. If you know enough about what's going on, you could geographically reference that information, and make use of it.

Same idea in the Syracuse area, with every shade of color there representing a different kind of land use. We can blow that stuff up to fantastic scales. We work with it at a scale of 1 to 24,000.

We found, again, another case where automatic machinery is far more expensive than human talent. We can process satellite imagery for as little as $300 for 10,000 square miles. If we have it done by automatic machine processes, it ranges from $3,000 to $12,000 for the same job. So there are a lot of things to be done here. Skylab is on the left, and Landsat imagery is on the right. We can use simple, low-cost methods of doing things.

Here we have the flow chart of a process of starting an inventory. You folks can't see what's on these circles, the words there, so I'll use them as my prop, and let you wonder what's going on.

We start by gathering all the information. We put a team out in the field to gather the information necessary to begin. We then merge this information, and go through an airphoto interpretation step.

We go up to the second layer of circles there, and we do some field checking. Then we come back down and draft the final maps. The bottom square on the left-hand side is where we get our first product. That, in and of itself, is the inventory. Now the rest of the operation is simply getting things into processing in such a way that we can handle things much more rapidly.

We go to a data code system, where we record things in books; get it onto IBM cards; go to keypunch operations, if we have to, or whatever input system we have; go to transfer of data, to various kinds of tapes and dispatch; and then we can produce our graphic display materials from our computers. So the whole operation does not depend upon a computer in any way whatsoever.

When the material comes in, it's in boxes, in bulk. We sort it out; get all the different kinds of resources we need together; stack the stuff up according to topographic quad areas. Everything is numbered, identified. We can, actually, dump the whole half million pages of material in one pile, and sort it all out again, and be sure we've got it in the right place. File systems are established and worked out very carefully, so that we know what's going on at all times.

The classification system is kept in front of our interpreters all the time. If there are changes that have to be made, we have to erase them, and make different marks on the board. Notice that the right-hand end of the board has been completely erased and rewritten, so we've had a great many changes in these things.

We have a field team that goes out. Usually, by visiting five county offices, we'll get all the information we need. We visit the county agriculture office, the county engineer's office, the county health office, the sheriff's office, and the civil defense director. With those five places, we get all the stuff that we need to know.

We keep track of all the information that we gather in our travels. We document it all. It's written up, and prepared for permanent filing.

Work is then transferred to the work maps from the field maps. As the airphoto interpreters get going, they are allowed as much time as they want to study any particular area that we're working on.

Put all the information together to begin with. Use very simple equipment for interpretation processes. Those glasses cost $12, and that's the major part of the equipment.

The transfer to topo maps is manual, by eyeball, for the very simple reason that the airphoto is never accurate in terms of XY

coordinates, and the topographic maps are. They are quite accurate.

The edges of the maps are verified. Then we go out on a field check. We test at least 100 sites per map, or 8 1/2 miles of frontage, whichever is the quickest. The maps are then verified in the field. We rank them. We give them a grade for accuracy, from 90 to 100 percent, depending on that field sample check we took. We then final ink the maps, and make them ready for the general public to use.

The information is reproduced on mylar material and sold at a nominal fee charge.

Once we've got the information onto maps, no matter what kind of a process we're undertaking, we develop a geographic referencing system. We had to regenerate on one project the entire UTM system for the whole state of New York because it had never been carefully located by the federal agencies.

We make paper weight materials and use these for our work maps from that point on. Point information, linear information, or area information can be recorded on various kinds of map systems.

We think of stacking up maps of information. For some projects — this one that I am showing you — we stack up three maps of information. For one project we did in Rhode Island, we stacked up 11 maps of information. We just keep on stacking this stuff up as high as we want.

We have very high-priced computing systems. This is a three-cent piece of plastic that we pay people to count dots or squares off of. It works very well. We can then record information on our own forms. I find that we can save as much as $30,000 on half a million forms, if we organize it so the keypunchers can work a lot faster. That's what we do.

The abacus is only $1.98, and desk-top calculators at the time this picture was taken were around $400. So the abacus works as fast and does exactly the same work as a calculator does.

The amount of information for a county, typically, can be stored in just a dozen or so notebooks. We also had an $80,000 digitizer, which we found added to the cost around ten times, ten hundred percent. The digitizer had its problems. For one thing, it made a horrible noise, and most people couldn't work with it very long.

We use ordinary keypunch operations a lot of the time. Then we go to the computer graphic display to check out the information and see whether we're getting the right kind of data in the system.

So, we have a whole series of products here. We've got multiple products that will satisfy almost any user.

We can enlarge the scale of our graphic display materials to any scale we wish. The master overlays are available for sale at $5 apiece.

This map illustrates a very simple problem. The person who wanted this project done wanted to add in 13 kinds of forests information instead of just three. If you add 13 kinds of information to cover the most abundant resource you have, you sure get one confusing map. That's what happened in this case. Those little areas that you're looking at are as small as an acre and a half.

Storage systems don't have to be glamorous, but they have to be effective, and they have to be usable. We keep the information available to all users. We have it in manual, drafted form. We have it in map form, and so forth. This is true for all the projects that we work on.

A few visuals of what goes on, when we start dealing with natural resources. This resource is Lake Champlain, with effluent from a paper mill. The source of the effluent is in the upper left-hand corner. And that's measured as a point in the system. The lines of shoreline that are affected by the effluent are a linear feature that can be measured. The surface area that's affected by the effluent is an area feature that can be measured. So that one illustration shows you can put information into a system in three basic ways.

This is Puerto Rico, where we did a lot of shoreline work. Sand is the most important resource that Puerto Rico has, along with sun.

Once they lose the sand, they're not going to be able to truck any more of it in. We did quite a little work on the underwater features there. You can have marinas. You can go as detailed as you want to. You can tell the number of boat slips, the length of the boat docks, and so forth. Shoreline development and cottages on our freshwater bodies is a feature that's certainly worth keeping track of.

Here's my favorite, one kind of junkyard, and the neighboring one is the other kind of junkyard. So you get both kinds of junkyards in the same classification, if you wish.

This is a rather tough place to get pictures of. They let you get pictures on the outside, but it's Dannemora State Prison. It's a public institution, and so it goes under a public classification category.

This looks like forest land to most people, but its prime use is as a ski resort. So it's an outdoor recreation classification unit. If they ever quit skiing there, why then it will be known as forest land. But for the time being, it's known as ski recreation.

This photo shows an awful lot of the different kinds of land use. You can identify things as small as this farm pond. There are, literally, hundreds of thousands of them in the state. All through the Northeast, the farm pond is a very common thing. Various grades of housing in the background. Hills showing the forest land, more forest land in the left-hand side of the picture. Pipelines, powerlines, and so forth, are readily identified. Public utility areas, discharge areas. These are simply seasonal motels; they operate in the summer only. Ski resorts are abundant all through the place.

Anyone recognize this? Anyone who has been in khaki, or gray, or blue, will certainly recognize the style of architecture, anyway. Military bases are public property. They are identified. Waste disposal from mining operations; machinery depots, where you have a tremendous outburst of oil and gas discharge; spoil banks from major mining operations. We have a lot of mining in the Northeast. People forget about that, but there is a lot of it. Roadside marketing is in the classification system. The construction of highways that give you silt galore, for years on end. There seems to be no way to stop that, administratively or otherwise.

We come up to such nice things as our platonic northern seaway, the St. Lawrence Seaway. Then we bring you back down to the very fragile environment of our oceanfront, which we are sitting very close to right here.

Well, those are the things that we have worked on in this kind of inventory. They're expensive sometimes. But if they are done properly, they can be effective and useful for decades. We now have the capability to do them quite accurately. We are up to something like 94 percent accuracy on some of these. They provide the best hope that we see for keeping track of natural resources over time.

From Muddling Through to Modeling Through

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As marine and coastal zone matters grow in importance and salience, so do the complexities of issues, programs, policies, and governmental agencies formed to deal with them. Regardless of the details of specific programs and policies, the substantive issues, or the level of government, there appear to be characteristics which are common for most marine and coastal activities. These programs and policies are the result of highly political policy-making processes involving numerous individuals with varying and often conflicting interests. There are usually complicated trade-offs involved. There are few easy solutions to marine and coastal problems. And the programs and policies deal with an enormously complex world where information is tentative and incomplete, yet frequently is so abundant as to overwhelm policy-makers.

The ramification of this last condition is that in order to obtain more meaningful information we will need to rely more and more on systematic techniques for handling data regarding marine and coastal complexities. However, while systematic techniques for processing information can perform important functions for policy-makers, they have their limitations. This circumstance, that systematic public policy analysis techniques have both advantages and limitations, obviously is understood by the organizers of this conference on "Formulating Marine Policy: Limitations to Rational Decision-Making." Indeed, as I understand it, one of the primary reasons for the convening of this conference is to clarify and to highlight the advantages and limitations of the use of systematic public policy analysis techniques in the marine and coastal context.

I find the subject for the panel on Information Needs for Decision-Making to be an especially interesting and complicated one. Almost everyone would agree that policy-makers need better information regarding marine and coastal programs and policies, yet there probably would be little agreement regarding the exact nature of that information and the best manner of generating it. Indeed, it should be anticipated that this panel will not produce agreement on the details of information needed for decision-making in the marine and coastal context. It probably is not even desirable to undertake such a task because information needs vary according to the problem being examined and the perceptions of the policy-makers responsible for making and implementing specific decisions. Nevertheless, I hope that those of us on the panel can identify some communalities in regard to information needs and methods of generating meaningful information. And I hope that our dialogue will help to clarify the issues and assist in focusing subsequent examinations of this important subject in the marine and coastal context.

As my contribution, I was asked to focus on "Evaluation Techniques for Assessing

Marine and Coastal Zone Programs." I welcomed the opportunity to do so because, being neither an expert in evaluation techniques nor an expert in marine and coastal problems, but being interested in these topics, I figured that I would learn a great deal. Now, after having done the research for this paper, I can say that was certainly the case. I was also intrigued with the suggestion of one of the conference organizers that, as a newcomer to the marine and coastal field, I would be able to make a contribution by bringing a fresh perspective to these matters. I hope that this is the case and that the real experts will not find my analysis to be too simple or too naive.

As I engaged in the research for this paper, I found that the political scientist in me greatly influenced my thinking. Indeed, the dominance of the politics of the policy-making process became ever clearer to me as I began to write a paper on the assigned topic. In order to reflect adequately my evolving concerns, I decided to change the title of the paper to "From Muddling Through to Modeling Through." To my way of thinking, the new title more adequately calls attention to the essential issue that I would like to discuss.

Any analysis of techniques for assessing marine and coastal programs and policies must start with a consideration of existing policy-making processes. Hence, I will begin by presenting an overview of what I see as a more or less typical "muddling through" policy-making process in the marine and coastal field. I will then discuss how several of the more frequently mentioned techniques for evaluating public policies and providing information for use by policy-makers could be used to change the muddling through policy-making process into what I will call a "modeling through" policy-making process.[1] Now, obviously there will be problems in moving from muddling through to modeling through policy-making processes, and these problems will present limitations to the actual use of systematic information-generating techniques. I will, accordingly, discuss several types of problems that are likely to be encountered in attempts to use these techniques in the marine and coastal context. Finally, I would like to share some conclusions and implications with you. I must warn you that I do not have all of the answers to questions concerning the prospects and problems in moving from muddling through to modeling through policy-making processes in the marine and coastal context.

A Muddling Through Policy-Making Process

A policy-making process consists of the series of events involved in making and executing decisions.[2] All policy-making processes in the marine and coastal field appear to have certain things in common. Each is essentially a political process where a number of policy-makers engage in a struggle over proposed actions. Most of these policy-making processes are highly structured and complex, and are viewed usefully as cybernetic systems. Inputs consist of information that comes into the policy-making process and is transformed by it. Outputs are the system's products, which are called actions. The system is the mechanism, called a policy-making process, that transforms inputs into outputs. Feedback consists of information regarding results of actions and is fed back into the system as a subsequent input.

It is the participants in the policy-making process who evaluate inputs and decide upon governmental actions. For the purpose of this discussion I will assume that there are six major types of marine and coastal policy-makers: (1) legislators, who are usually elected representatives and serve as members of the parliamentary bodies of the government (e.g., senators, city councilmen); (2) the executive head, who is usually elected and is responsible for the administrative operations (e.g., presidents, governors, and mayors); (3) bureaucrats, who are civil servants and comprise the governmental bureaucracy; (4) representatives of other governments, who are probably most frequently bureaucrats for governments involved in joint marine and

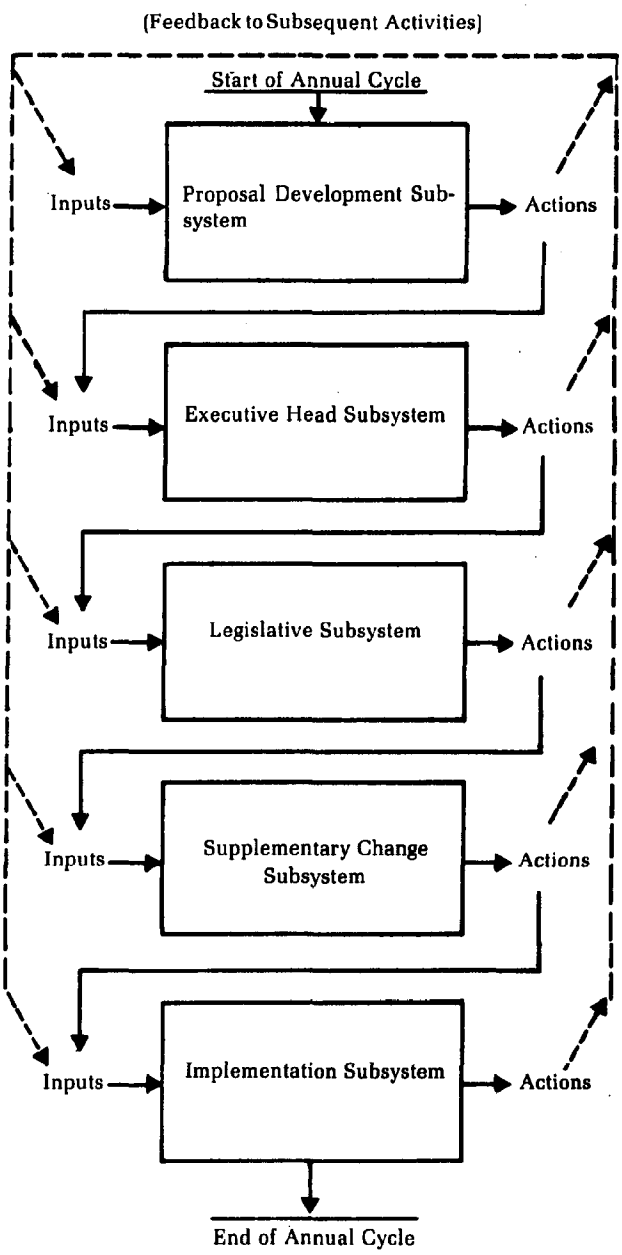
coastal activities; (5) representatives of non-governmental organizations, who most frequently represent interest groups and businesses; and (6) experts, who are selected because of their technical expertise and usually serve in their personal capacity.

These policy-makers consider a variety of information when deciding and implementing marine and coastal activities for governments. Agency precedents provide an incremental basis for policy-making, while agency goals and program repertoires condition the response to specific situations. Information from sources within the agency can be viewed as an organizational input, whereas information from sources outside the agency is considered to be an external input. Examples in the latter category include communications from other governments, demands from non-governmental entities in the task environment, and public opinion.

In interacting in the policy-making processes, which are, of course, highly political, the marine and coastal policy-makers appear to develop patterns of behavior, which I will call policy-making rules. The policy-making rules provide the calculus by which information coming into a policy-making process is transformed into programs and policies. It appears to me that in the marine and coastal context the policy-making rules are highly incremental and disjointed.

The events involved in deciding on and implementing marine and coastal programs and policies usually take place over a period of several months, and for the sake of this discussion, I will assume that the policy-making process involves five analytically distinct steps or subsystems. Each of the subsystems occurs during a different time period and each involves distinct governmental activities. Each subsystem involves a slightly altered set of circumstances with potential differences existing in inputs, activities of policy-makers, and policy-making rules. An overview of such a policy-making process is presented in Diagram 1. For the purpose of this discussion, I will focus on a more or less typical annual budgetary process in the marine and coastal context.

Diagram 1. A Muddling Through Policy-Making Process in the Marine and Coastal Context



The first subsystem, which I will call the proposal development subsystem, involves preparation of specific proposals for action. These are usually presented in the form of budget proposals by a department head. These

activities take place primarily at the bureaucratic level, and this subsystem usually ends when these proposals are submitted to the executive head several months before the start of the relevant fiscal year. In these proposals the department heads appear to focus upon justification of the change in the budget from the one approved for the previous year. Thus, the policy-making rules appear to be highly incremental in nature. The primary policy-makers are the bureaucrats, with other types of policy-makers playing secondary but occasionally important roles. This subsystem appears to be dominated by bureaucratic politics.

The executive head subsystem involves decisions by the executive head on the budget proposals and the submission of the amended proposals to the legislative body for approval. These activities usually occur several months before the fiscal year of concern. The primary policy-maker is the executive head (and his or her closest advisers), with other policy-makers playing a secondary role. The actions taken in the previous (proposal development) subsystem and the past and anticipated actions of the succeeding (legislative) subsystem place constraints on the decision-making in the executive head subsystem, and the major focus appears to be on matters in the margins, with special emphasis being placed on the change in the budget approved for the previous year. A wide variety of general political factors appears to be highly relevant in this subsystem.

The legislative subsystem involves approval of a budget by the legislature. These activities occur most frequently during the months immediately preceding the start of the relevant fiscal year. The primary policy-makers are the legislators, with other policy-makers playing important but secondary roles. Formal debate and informal negotiation can take place in the legislature, and it seems reasonable to view the actions of this subsystem as being the result of a highly political bargaining process. Again, the focus appears to be on the changes in the budget from the one approved for the previous year, and the policy-making rules seem to be incremental in nature.

Numerous changes may be made to the budget after its adoption by the legislature. Activities concerned with these changes comprise the fourth subsystem in the policy-making process, one which I shall call the supplementary change subsystem. These activities usually begin immediately following the legislative subsystem and end just prior to the conclusion of the relevant fiscal year. The bureaucrats, executive head, and legislators appear to be the primary policy-makers, in that order of importance.

The last subsystem in the policy-making process involves carrying out the approved (perhaps amended) budgetary programs during the relevant fiscal year. Activities include the hiring of staff, purchase of materials, and detailed execution of the program of action contained in the approved budget. This subsystem, which I am calling the implementation subsystem, appears to me to have the effect of frequently changing the budgeted marine and coastal activities through interpretation and implementation. Activity in this subsystem involves the bureaucrats primarily, with the other policy-makers playing secondary roles. This subsystem is dominated by bureaucratic politics.

Each of the subsystems should be viewed as having its own inputs, outputs, feedback, and process characteristics. The policy-making rules and activities appear to differ somewhat according to subsystem and issue areas. One of the most striking features of marine and coastal policy-making processes is their complexity. Numerous policy-makers, representing varieties of viewpoints, are dealing simultaneously with numerous overlapping issues. Information is incomplete and rationality appears to be bounded. The general policy-making environment is highly political. It appears to me that many marine and coastal policy-making processes are overwhelmed by crosscutting political currents and complicated task environments and that

policy-makers reduce complexity and ambiguity by focusing on matters in modest incremental terms. Certainly the policy-making process that I have described here is a version of what Charles E. Lindblom has called a muddling through policy-making process.[3] I expect that such a policy-making process is fairly typical of those to be found in the marine and coastal context and that mainly differences of degree will be found in nonbudgetary processes in this same field. Most important, I hope that the policy-making process that is described is representative enough of those found in the marine and coastal context so that a discussion of its transformation into a modeling through policy-making process is meaningful to marine and coastal specialists.

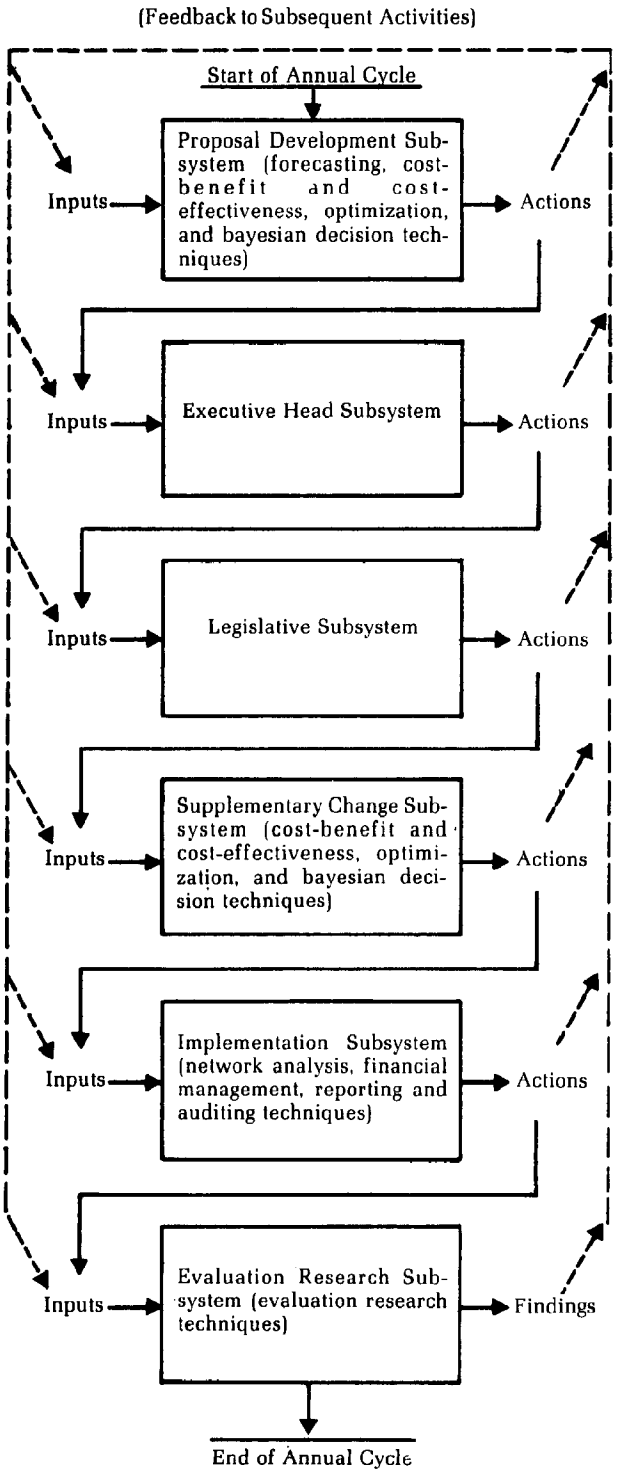
A Modeling Through Policy-Making Process

In a muddling through policy-making process, the policy-makers are constantly evaluating policies and programs by processing information which becomes available to them. Because of information overload and situational complexity, the information flow and its processing frequently are not very systematic. The result is that simplifying "rule of thumb" policy-making rules (e.g., incremental ones) are employed. In what I am calling a modeling through policy-making process, an attempt is made to organize the selection, flow, and processing of information, and richer, more focused, and more rigorous analyses are undertaken in an effort to supplement the analyses that are normally used in a muddling through process.

Now, while public policy problems usually have unique solutions, at least in regard to details, it is nevertheless possible to classify many of the problems into a relatively small set of general types. Indeed, during the last quarter century an informal categorization of problems has taken place, and analysis techniques address themselves to and frequently can provide useful information regarding the solutions to specific categories of public policy problems.[4] For example, many public policy problems concern the optimal allocation of resources to numerous programs, and a set of optimization techniques (e.g., linear and nonlinear programming) has been developed and can be used in specific circumstances by policy-makers to examine allocation problems.

It seems to me that several of these public policy analysis techniques are potentially useful for generating information which is frequently needed by policy-makers working on marine and coastal programs and policies. I would like to consider briefly the following types of techniques: (1) evaluation research techniques, which provide information on the actual impact of programs and policies; (2) forecasting techniques, where the emphasis is on providing information about the future by means of extrapolation of past trends; (3) cost-benefit and cost-effectiveness techniques, where the emphasis is on providing information about efficiency; (4) optimization techniques, where the primary concern is providing information on the allocation of limited resources to various programs in such a way as to achieve an objective function; (5) bayesian decision techniques, where the emphasis is on systematizing and consolidating information on subjective probability estimates of achieving certain end states such as program success; (6) network analysis techniques, which provide scheduling and monitoring information concerning the implementation of complex programs; and (7) financial management, reporting, and auditing techniques, which provide information regarding the handling of financial resources.[5] In an attempt to demonstrate in a simple fashion where these techniques might be used in marine and coastal policy-making processes, I have modified Diagram 1, which presented a version of a muddling through policy-making process, and in Diagram 2 I have presented an overview of a modeling through policy-making process.

Diagram 2. A Modeling Through Policy-Making Process in the Marine and Coastal Context



Evaluation Research Techniques

The evaluation research approach is concerned with the full range of operational procedures involved in the systematic empirical examination of hypotheses regarding the impact of social action programs and policies. It emphasizes the use of the scientific approach to examine these hypotheses. The use of evaluation research techniques in the marine and coastal field would most likely result in the addition of a sixth subsystem in the policy-making process, one which I will call the evaluation research subsystem. The promise of the evaluation research approach is that it can provide systematic information on the actual impact of programs and policies and feed this information back through the policy-making process in such a way that it can influence the making of subsequent decisions regarding ongoing enterprises.[6] The activities associated with this subsystem probably would begin along with those of the proposal development subsystem and be concluded several months after the end of the implementation subsystem. These activities would involve primarily the bureaucrats and perhaps some outside experts who would serve as consultants. The political factors from the rest of the policy-making process probably would manifest themselves in the evaluation research subsystem and have an effect on the design, execution, and reporting of evaluation research analyses. Evaluation research information should be especially helpful to marine and coastal bureaucrats trying to demonstrate program and policy accomplishments to those to whom they are responsible, especially those who are paying for the activities.

Forecasting Techniques

Numerous techniques are available for the development of forecasts regarding marine and coastal matters. They involve the extrapolation of trends, using exponential smoothing and Box-Jenkins autoregressive moving average models, the expansion of detailed budget estimates over future years,

examination of hypothetical future scenarios through use of econometric and computer simulation models, as well as other methodologies.[7] The forecasting activities probably would be carried out primarily by bureaucrats and probably would take place in the proposal development subsystem. The specific information provided regarding the future probably would be most useful to bureaucrats.

Cost-Benefit and Cost-Effectiveness Techniques

These techniques emphasize the calculation of the ratio of cost to return for a program. They are part of a general approach to efficiency and are helpful, especially when used comparatively for clarifying the potential consequences of alternative choices of programs and policies. It seems to me that these techniques would be most helpful in marine and coastal policy-making processes in the proposal development subsystem, although they also could be used in the supplementary change subsystem to evaluate possible program and policy revisions. Specific cost-benefit and cost-effectiveness information could be given to policy-makers in the executive head and legislative subsystems, but it is the bureaucrats participating in the proposal development and supplementary change subsystems who probably would find it most useful.[8]

Optimization Techniques

These techniques focus on complex allocation of resources problems in such a manner as to provide information on the mix of resources that will best achieve an objective function, given a certain set of constraints. I think that these techniques would be most helpful in marine and coastal policy-making processes in the proposal development subsystem, although from time to time they might be used in the supplementary change subsystem. Specific information from studies using optimization techniques could be given to the policy-makers in the executive head and legislative subsystems, but it appears that the bureaucrats participating in the proposal development and supplementary change subsystems would find it most useful.[9]

Bayesian Decision Techniques

These techniques frequently employ a decision theoretic approach utilizing bayesian statistics and multi-attribute utility analysis. At the heart of this approach is the estimation of the probability of achieving certain end states such as goal attainment. The emphasis is on the calculation of subjective prior probabilities of items such as program success, which can be recalculated as posterior probabilities after information on program effectiveness is available. It appears to me that information obtained using these techniques would be most useful to bureaucrats in the proposal development subsystem in marine and coastal policy-making processes, although it might also be helpful to them in the supplementary change subsystem.[10] It is likely that bureaucrats participating in those subsystems would be most directly involved in the use of bayesian decision techniques.

Network Analysis Techniques

This group of techniques includes the program evaluation review technique (PERT) and critical path method (CPM) and utilizes networking ideas. These techniques are concerned primarily with the scheduling and monitoring of complex programs. The emphasis is on managerial control and these techniques would be used in the implementation subsystem in a marine and coastal policy-making process. [11] It appears likely that network analysis techniques would be used by bureaucrats and provide meaningful information for them.

Financial Management, Reporting, and Auditing Techniques

There are numerous accounting and financial management techniques which focus on the managing, reporting, and auditing of the

financial aspects of agency activities. They are concerned primarily with the proper dispersal of funds, and information from them probably would be most useful to bureaucrats in the implementation subsystem of marine and coastal policy-making processes. These techniques would be used by bureaucrats and experts (e.g., outside auditors). Incidentally, it appears to me that all policy-making processes in the marine and coastal field already make some use of these techniques.[12] Thus, the difference between a muddling through and a modeling through process, in regard to these techniques, is likely to be one of degree.

The aforementioned techniques are complementary, with each being oriented to a different but not inconsistent aspect of programs and policies. Each type of technique produces information that could be of use to marine and coastal policy-makers. In general, this information appears to be most useful in the proposal development, supplementary change, and implementation subsystems of policy-making processes. It appears to me that, in general, this information would be most useful to the higher-ranking bureaucrats, the "middle managers" of public sector marine and coastal programs and policies.

It is worth noting that cost-benefit and cost-effectiveness techniques, optimization techniques, network analysis techniques, and financial management, reporting, and auditing techniques focus primarily on some aspect of the expenditure of resources. They would be of greatest utility on budgetary matters. The forecasting techniques, bayesian decision techniques, and evaluation research techniques are of real potential utility on both budgetary and nonbudgetary matters.

The social science literature contains considerable discussion of public policy analysis techniques and debates concerning their ability to "improve" policy-making processes. Some proposals, especially those of the 1960s, emphasized the development of large-scale models of policy-making processes, and there were calls for the development of quite elaborate new systems in proposals for planning, programming, budgeting systems (PPBS),[13] and management information systems (MIS).[14] The zero-base budget proposals of the 1970s also appear to call for the establishment of elaborate new systems.[15] Nevertheless, the use of the techniques discussed here is not limited to situations involving development of new and elaborate systems. These techniques could be utilized and could be helpful in essentially disjointed incremental policy-making processes. It is simply the use of these information processing techniques which creates what I am calling a modeling through policy-making process. I am not concerned here with the development of new large-scale systems. I will leave that matter for another paper. I am concerned here with the selective use of certain modeling techniques in a muddling through policy-making process and I am calling the resulting system a modeling through policy-making process.

Problems in Moving from Muddling Through to Modeling Through Policy-Making Processes

Each of the aforementioned techniques was developed to help policy-makers understand a complex world, but employs a complex methodology in attempting to achieve this goal. To my way of thinking, the really important question concerning a modeling through policy-making process is: Will it really work? To answer this question, it is necessary to consider the practical limitations of the modeling through techniques. In order to develop a tentative answer to this question for the marine and coastal context, I would like to turn now to a consideration of the problems likely to be encountered in the marine and coastal context as attempts are made to use what I have called modeling through techniques. At the risk of oversimplification, I would like to focus upon ten general types of problems which appear to limit the utility of these techniques. I would like to discuss briefly these problems, without arguing that my list is necessarily a complete one.

Problems of Identifying Meaningful Focuses for Analysis

It will not always be easy to identify and to state clearly the research problem or focus for techniques that evaluate various aspects of policies and programs. There appear to be numerous marine and coastal programs and policies with ambiguous goals, conflicting goals, unclear strategies concerning implementation, and even general confusion about the basic enterprise. Given the highly political nature of the policy-making processes that produce most marine and coastal programs and policies, it would be surprising to find clarity on many of these issues or even on the purposes for undertaking analyses using modeling through techniques. Decisions on what to analyze and how to analyze it will not be easy ones, and the ground rules may change before the analysis has been completed.

Measurement Problems

The measurement rules used in an analysis provide the crucial link between concepts and data. It is difficult to measure adequately the properties of many concepts, and frequently there is little agreement on how to do so. To understand my point, consider briefly the difficulties that those at this conference would have in developing adequate measurement rules for concepts such as beach access and multiple use. It is, of course, problematical to attempt to conduct empirical studies involving concepts or their relationships without first developing faith in the measurement rules which relate the concepts and the data.

Data Collection Problems

It appears that in the marine and coastal field there is a great deal of missing data, definitions and categories used for data collection seem to change frequently, many data are available for only a short period of time, and it is frequently the case that available data do not lend themselves to providing answers to interesting questions. In brief, there is a shortage of meaningful and reliable data for the analysis of marine and coastal policies and programs. It appears that for the foreseeable future special emphasis will need to be placed on making data collection a part of programs, and numerous data collection problems undoubtedly will be encountered as this is done. Personally, I have serious reservations about the creation of large-scale expensive data banks without very clearly identified and important uses for the data contained therein.

Data Analysis Problems

It can be anticipated that frequently there will be problems in analyzing data. Unfortunately, optimal solutions are not yet available for all such problems, although it does appear that reasonable solutions can be found for most of them. Because of the high level of expertise required, it may be necessary for marine and coastal policy-makers to obtain expert statistical advice. The danger, of course, is that improper data analysis will produce statistical artifacts that result in misleading conclusions being drawn on the basis of the data analysis.

Ethical Problems

There are numerous potential ethical problems revolving around issues such as: (1) withholding treatment from control group cases; (2) confidentiality of information; and (3) honesty in reporting results. In the final analysis, if the potential ethical problems cannot be resolved, then the analysis should not be undertaken. It appears to me that it will be a rare case in the marine and coastal context when ethical concerns will be of sufficient magnitude to force cancellation of an analysis. Analysts, nevertheless, will need to be aware constantly of the potential ethical ramifications of their research activities.

Communication Problems

Messages, whether written or oral and whether long or short, will not always be clear

because of a variety of factors such as different meanings being given to the same words or phrases.[16] Among the apparent reasons for this would be different orientations and training of individuals. Special care must be taken to avoid jargon and to communicate clearly concerning analyses undertaken with modeling through techniques. It should be obvious that even the most persuasive and relevant research findings will have limited impact if they are not communicated clearly.

Problems of Personalities

Personality conflicts or an important individual's personality may place serious constraints on a particular analysis or, indeed, on the general use of modeling through techniques. It appears to me that the inner predispositions and orientations of key policy-makers may well determine the actual usefulness of modeling through techniques, although this utility will undoubtedly be conditioned by the chemistry of the interactions of various important personalities. There are no simple solutions for the problems of personalities, although sensitivity and the use of common sense may help a bit in dealing with these problems.

Organizational Problems

There are numerous bureaucratic and agency-related problems which I will call organizational problems. Among the more important ones are the resistance of bureaucrats to systematic analysis and its implied change, the high level of skill required for using most of the techniques discussed here, role conflicts, institutional conflicts, and the cost of studies. There also are numerous factors in the task environment of specific agencies which may result in difficulties in using modeling through techniques in the marine and coastal context. However, while organizational problems will be among the most serious impediments to the use of modeling through techniques, it does appear that they can be alleviated somewhat through the use of strategies such as support from important administrators, involvement of bureaucrats in the research enterprise, and clear role definition and authority structure.

Problems of the Timing of Studies

If the completed study is not available when needed by policy-makers, then it will not be used. It is that simple. The timing of relatively fixed policy-making processes and the extended period of time needed for many analyses means that the use of modeling through techniques to provide timely information will be constrained in the marine and coastal context. An effort must be made to anticipate well in advance the studies that need to be conducted, and attempts must be made to adjust research designs to the constraints imposed by the timing of policy-making processes.

Problems of the Relevance of Findings

The findings must be relevant directly for the decisions at hand and should be conclusive. Even then, they will be only part of the relevant information considered by policy-makers. These findings will be used in political processes where factors other than long-range organizational concerns, efficiency, effectiveness, optimal mixes of activities, subjective estimates of probability of success, scheduling and monitoring of program implementation, and sound financial management will be of major importance. It is likely that the findings will be used frequently in a partisan manner by policy-makers to support positions already arrived at on the basis of disjointed, incremental policy-making rules.

It can be anticipated that these problems and the complications which result from their interaction will vary in importance from analysis to analysis and from agency to agency. In some instances in the marine and coastal context it probably will be the case that one or a combination of these problems will be so severe as to preclude the meaningful use of one or several modeling through techniques.

However, it is my opinion that many versions of these problems can be solved in an adequate manner through a flexible and creative effort on the part of those concerned with the analysis. Nevertheless, these problems present limitations to the use of modeling through techniques. I would estimate that these modeling through techniques could be used meaningfully for only a very small percentage of decisions in marine and coastal policy-making processes, although it appears that a significant contribution can be made in those situations when it is possible to employ them. It does seem clear that a modeling through policy-making process is a fragile one. It is my guess that in the marine and coastal context the degree of change from muddling through to modeling through processes will be limited, at least in the near future.

Conclusions and Implications

Assuming that the analysis presented so far is not too incorrect, then several conclusions seem to be in order. The primary advantage of modeling through techniques is that more dependable and focused information may be made available to policy-makers, especially bureaucrats making decisions in the proposal development, supplementary change, and implementation subsystems in marine and coastal budgetary processes. However, it appears that it would be a mistake to expect too much in the marine and coastal context from modeling through techniques, just as it would be a mistake to dismiss them as having nothing to offer. Thus modeling through techniques would appear to be neither as useful as many of their proponents suggest nor as useless as many of their opponents suggest. These techniques will be helpful in providing relevant information in certain circumstances, and in those situations they will be valuable in assisting marine and coastal policy-makers in handling the complexities of their environment. What I have called modeling through techniques should be introduced carefully into the arsenal of aids available for policy-makers in the marine and coastal field and they should be used when needed for meaningful analysis.

The discussion of problems in moving from muddling through to modeling through policy-making processes, which I presented, does not contain the final word. While it seems clear that the problems in the utilization of modeling through techniques will vary in importance according to situations and are not of such magnitude that they will preclude the use of the methodologies in the marine and coastal context, it also seems clear that there will be no easy solutions to many of these problems. At least, that is the way it appears to this newcomer to the marine and coastal field.

What can be done to facilitate the use of modeling through techniques? Russell L. Ackoff and Maurice W. Sasieni pointed us in the correct direction in a couple of caveats which were presented some years ago in their book, entitled *Fundamentals of Operations Research:*

> The researcher should not make the mistake of assuming that the decision maker cannot distinguish between "good" and "bad" research because he is not a researcher himself. Keep in mind that one does not have to be able to lay an egg to tell the difference between a good and a bad one.[17]
>
> Ultimate acceptance of the solution (results of the analysis in my terms) by managers depends largely on their belief that the problem solved is the one they have and on their understanding of and trust in the process by which a solution was obtained.[18]

Thus, "good" analyses must be conducted, and if an analysis is a "bad" one, it should be admitted to and the results should not be pushed. Furthermore, a key factor in overcoming problems lies in the attitudes of the policy-makers involved in specific situations. In the final analysis, no policy-maker considering an important decision wants to rely on an analysis technique that is not understood and trusted.

Because the usefulness of modeling through techniques appears to depend on the orientation and training of the policy-makers, there is the implication that bureaucrats in the marine and coastal context should learn about these techniques. Thus, there appears to be a need to emphasize short courses and

summer institutes on modeling through techniques and marine and coastal programs and policies. These courses should be oriented toward mid-career bureaucrats. Making bureaucrats better informed regarding these techniques should help promote their meaningful use in the marine and coastal context.

It seems to me that there also are implications concerning the facilitation of the building of a broadly based competence in modeling through techniques and marine and coastal programs and policies. Thus, a central clearinghouse might be in order. Such a clearinghouse could facilitate communication among policy-makers using modeling through techniques to examine marine and coastal activities by promoting newsletters, organizing meetings, providing a depository for studies and data in the marine and coastal field, conducting literature searches and maintaining an up-to-date bibliography, and facilitating the carrying out of other activities as appropriate. Perhaps a section of a professional society should be organized around the topic of modeling through techniques and marine and coastal programs and policies. These ideas could be facilitated by the establishment of the clearinghouse infrastructure at an institution such as the University of Rhode Island. Perhaps the personnel associated with the clearinghouse could perform some of the educational functions mentioned earlier.

There are implications also for the funding decisions of agencies in the marine and coastal field. These agencies should be willing to fund meaningful analyses of their programs and policies and to allow released time for the education of bureaucrats. Grants providing time for scholars to use modeling through techniques in the marine and coastal context also are in order. There is little likelihood that there will be significant use of modeling through techniques in the marine and coastal context without adequate financial support to get things started and to keep them going.

In addition to using the modeling through techniques to study substantive questions, policy-makers and scholars should begin to document systematically the problems of using the techniques in the marine and coastal context. We still have a great deal to learn about the use of these techniques in this context, and a contribution could be made by clarification of the problems in moving from muddling through to modeling through policy-making processes. I encourage policy-makers and scholars to become involved in examining these important matters.

Let me end by saying that I hope that this sorting-out process in which I have engaged has provided a helpful perspective for marine and coastal specialists.

Notes

1. To the best of my knowledge, Bertram M. Gross was the first to use the phrase "modeling through." See Bertram M. Gross, "Management Strategy for Economic and Social Development: Part II," *Policy Sciences* 3 (1972): 14. Unfortunately, he did not develop very fully the definition or meaning of a modeling through policy-making process. The meaning attached to a modeling through policy-making process in this paper is mine.
2. The general orientation presented in this section is developed more fully and used in an analysis of budgetary activities in an international organization in Francis W. Hoole, *Politics and Budgeting in the World Health Organization* (Bloomington, Indiana: Indiana University Press, 1976). Taking off from that study, L. Harmon Zeigler and Harvey J. Tucker have conducted a somewhat similar analysis of American state and local politics. See L. Harmon Zeigler and Harvey J. Tucker, *The Quest for Responsive Government* (North Scituate, Mass.: Duxbury Press, 1978), 135-87. This same orientation also serves as the basis for the analysis of data from three international organizations in Francis W. Hoole, Brian L. Job, and Harvey J. Tucker, "Incremental Budgeting and International Organizations," *American Journal of Political Science* 20 (1976): 273-301.
3. Charles E. Lindblom, "The Science of Muddling Through," *Public Administration Review* 19 (1959): 79-88.
4. Cf. Russell L. Ackoff and Maurice W. Sasieni, *Fundamentals of Operations Research* (New York: Wiley, 1968).
5. I make no claim to be discussing all of the potentially relevant techniques, but I do believe that the techniques that are discussed are among the ones that marine and coastal policy-makers will find most helpful. For an introduction to other techniques

that might be useful in the marine and coastal context, see Ackoff and Sasieni, *Fundamentals of Operations Research.*

6. The evaluation research techniques are potentially relevant for the examination of a wide range of marine and coastal issues. For example, they could be used to evaluate the impact of the California Coastal Act of 1976 or the extension of certain federal jurisdictions to include 200 miles of coastal water. For a general introduction to evaluation research, see Henry Riecken, Robert F. Boruch, Donald T. Campbell, Nathan Caplan, Thomas K. Glennan, Jr., John W. Pratt, Albert Rees, and Walter Williams, *Social Experimentation: A Method for Planning Social Intervention* (New York: Academic Press, 1974); and Francis W. Hoole, *Evaluation Research and Development Activities* (Beverly Hills, California: Sage Publications, 1978). For information concerning evaluation research and marine and coastal activities see Francis W. Hoole, "Evaluating the Impact of Marine and Coastal Policies: A Hard-Nosed Approach," in *The Oceans and Our Future*, ed. Robert L. Friedheim (New York: Marcel Dekker, 1978); Francis W. Hoole and Robert L. Friedheim, "Evaluation Research and Marine and Coastal Policies," Occasional Paper Number 4, Institute for Marine and Coastal Studies, University of Southern California, Los Angeles, California, April 1978; Francis W. Hoole and Robert L. Friedheim, "A Selected Bibliography of Evaluation Research for Marine and Coastal Specialists," Occasional Paper Number 5, Institute for Marine and Coastal Studies, University of Southern California, Los Angeles, California, April 1978; and Francis W. Hoole, Susan H. Anderson, and Robert E. Bowen, "The California Coastal Zone Conservation Act of 1972: Evaluating Its Impact on Beach Access," Occasional Paper Number 6, Institute for Marine and Coastal Studies, University of Southern California, Los Angeles, California, June 1978.
7. Forecasting techniques could be used for various purposes by marine and coastal policy-makers. For example, projections of beach attendance could be of assistance in determining the number of lifeguards needed, projections of petroleum availability and use could help in the establishment of policies for offshore drilling, and projections of revenue could be useful in developing budgets. For a general introduction to forecasting techniques, see Steven C. Wheelwright and Spyros Makridakis, *Forecasting Methods for Management*, 2nd ed. (New York: Wiley, 1977).
8. Cost-benefit and cost-effectiveness techniques could be very helpful in the marine and coastal context. For example, analyses of the costs and benefits of enforcing the 200-mile fishing regulations would be useful, as would studies concerning the siting of liquid natural gas and nuclear power facilities. For a general introduction to cost-benefit and cost-effectiveness analysis, see Jerome Rothenberg, "Cost-Benefit Analysis: A Methodological Exposition," in *Handbook of Evaluation Research*, vol. 2, ed. Marcia Guttentag and Elmer L. Struening (Beverly Hills, California: Sage Publications, 1975): 55-88; and Henry W. Levin, "Cost-Effectiveness Analysis in Evaluation Research," in *Handbook of Evaluation Research*, 89-122. For information concerning cost-benefit analysis and coastal activities, see J. W. Devanney III, G. Ashe, and B. Parkhurst, *Parable Beach: A Primer in Coastal Zone Economics* (Cambridge, Mass.: The M.I.T. Press, 1976).
9. Optimization techniques could be used for numerous allocation problems in the marine and coastal context. For example, they could be used to allocate personnel to various tasks with the goal of maximizing port safety or to allocate money to various programs for cleaning up oil spills. For an introduction to this approach, see R. Stansbury Stockton, *Introduction to Linear Programming* (Homewood, Illinois: Richard D. Irwin, 1971).
10. Bayesian decision techniques will appeal to those interested in capturing in a formal way the intuition contained in subjective estimates. For example, they might be useful for Sea Grant program managers attempting to assess the probable success of engaging in certain advisory services. For an introduction to this approach, see Ward Edwards, Marcia Guttentag, and Kurt Snapper, "A Decision-Theoretic Approach to Evaluation Research," in *Handbook of Evaluation Research*, vol. 1, ed. Elmer L. Struening and Marcia Guttentag (Beverly Hills, California: Sage Publications, 1975), 139-81.
11. Network analysis techniques would be helpful in managing the implementation of large-scale, complex, and time-consuming marine and coastal programs. For example, they might be used to schedule and monitor the construction of a new multiple-use park on a remote coast or island. For an introduction to these techniques, see Jerome D. Weist and Ferdinand K. Levy. *A Management Guide to PERT/CPM* (Englewood Cliffs, New Jersey: Prentice-Hall, 1969).
12. Financial management, reporting and auditing techniques have been used for a long time in the marine and coastal context, and their use is undoubtedly familiar to most readers. Many accounting and financial management textbooks provide introductions to these techniques.
13. For an introduction to planning, programming, budgeting systems, see Fremont J. Leyden and Ernest G. Miller, eds., *Planning, Programming, Budgeting: A Systems Approach to Management*, 2nd ed. (Chicago: Markham, 1972); and David Novick, ed., *Program Budgeting: Program Analysis and the Federal Budget* (Cambridge, Mass.: Harvard University Press, 1965).
14. For an introduction to management information systems, see Raymond J. Coleman and M. J. Riley, eds., *MIS: Management Dimensions* (San Francisco: Holden-Day, 1973).
15. For an up-to-date introduction to zero-base budgeting, see Paul J. Stonich with John C. Kirby, Jr., Howard P. Weil, Kent A. Thompson, and Eric E.

von Bauer, *Zero-Base Planning and Budgeting: Improved Control and Resource Allocation* (Homewood, Illinois: Dow Jones-Irwin, 1977).

16. I am grateful to Robert L. Friedheim for suggesting that the categories "communication problems" and "problems of personalities" be added to my list of problems in moving from muddling through to modeling through policy-making processes.
17. Ackoff and Sasieni, *Fundamentals of Operations Research*, 406.
18. Ackoff and Sasieni, *Fundamentals of Operations Research*, 410.

The Marine Environment and Resources Research and Management System at the Virginia Institute of Marine Science

John B. Pleasants

Executive Assistant to the Director, Virginia Institute of Marine Science

MERRMS is a system that I developed early in 1971. It's gone from a rudimentary collection of documents to what we now consider a comprehensive point source of information on the marine environment and related subjects, such as coastal zone management.

The emphasis in our system is quite naturally on the Chesapeake Bay and the Virginian Sea, which is sometimes referred to by the uninitiated and uninformed as the "Middle Atlantic Bight." Although this is our area of concentration, MERRMS contains some information on other areas of the country; but the farther one goes from the waters of the Commonwealth, the less information in our system one is apt to find. To understand why this is so, as well as the thrust behind the development of MERRMS, it's necessary to understand the position occupied by the Virginia Institute of Marine Science in the hierarchy of the Commonwealth.

VIMS is, to my knowledge, unique. It's a creature of the Commonwealth and placed in the executive branch of the state government, in the Secretariat of Commerce and Resources. It is also an educational institution, being the School of Marine Science for the College of William and Mary. Our director is double-hatted as dean, and most of our professionals hold faculty rank. We have a strictly graduate program, with about 100 students pursuing master's or doctorate degrees, which are granted by William and Mary. For this reason, there are those who feel that the Institute more properly belongs under the Secretary of Education. The Code of the Commonwealth is ambiguous on this subject, referring to the Institute once as an independent research and advisory agency and twice as an educational institute. We have, counting all hands, about 550 people on board.

VIMS has no management authority for the marine resources of the Commonwealth. Instead, the Institute serves as adviser to the managers, such as the Virginia Marine Resources Commission and the State Water Control Board. In fact, VIMS provides advice to all state institutions whose work impinges on the marine environment or its creatures. We also provide advice to individuals and citizen's groups, as well as industry, when we feel it's in the interest of the Commonwealth to do so.

It is this advisory portion of our mandate that led to the creation of MERRMS. As is often the case with advisers, we frequently found we didn't really have enough information to make a good comment. The frustrating part was that we often knew that the information was available, but we couldn't pull it together in time to answer our needs. MERRMS, then, is an effort to pull the information together for once and for all, and make it readily available through the use of computers, special indexing, and advanced visual displays.

It's often referred to as a "warroom" or a

"combat information center" in our informational efforts. Here we bring together those with problems, our experts, and the readily retrievable information which MERRMS contains. Those of you with naval experience no doubt remember that the purpose of CIC on board warships is to collect, collate, and display information. This was one of my guiding principles while I developed MERRMS.

Let us now examine the elements that make up MERRMS, the various subunits that provide access to the information we disburse.

When I was first given the job of creating MERRMS, I set about collecting relevant, easily available, but scattered data, which was already at various locations throughout the Institute. These included topographic maps; county highway maps of tidewater areas; national ocean survey charts of all western Atlantic waters, including all those available for Chesapeake Bay; and all the aerial photos, from whatever source, that had been collected over the years by individual researchers for various projects.

Incidentally, trying to make a logical, easily searchable file of aerial photographs from several different sources, with no discernible common denominator, is a study in itself. I recommend it to anyone who is interested in both jigsaw puzzles and cryptology for something he can do in his spare time.

Well, with these basic things behind me, I had already built a considerable data base, without expending a great deal of money or effort. True, the information had always been there, but now we could always find it whenever we needed it.

I decided early on that we needed a small, special-purpose library. The decision was made, at about this point, to make it all microform. I decided we should use microfiche and that we should have the ability to make our own. Both of these decisions were to prove fortuitous.

Microfiche masters are clear mylar jackets into which strips of microfilm can be slipped. The form we use is about four by six inches in area, and holds 60 frames of 16 millimeter microfilm. These sheets, as many as necessary, properly titled and numbered, can be placed in a special envelope and filed as a publication.

These microfiche masters can be copied very quickly and inexpensively. Our little machine copies about two sheets every 45 seconds, at a cost for materials of slightly over a nickel a sheet.

We have three types of readers to read our microfiche: the portable ones, which we check out to whomever needs them; the stationary ones, which have variable magnification and are somewhat larger; and the reader-printer, which gives us a hard copy of any particular microfiche frame that we need.

Microfiche gives us one more advantage. Copying is so simple, and so inexpensive, that a request for a particular document can be sent out by return mail at a reasonable cost. Local users can take a copy of a publication and a portable reader with them. Since our master never leaves MERRMS, our files are always complete. We have never yet — cross my fingers — lost a document, and we've checked out thousands of them.

Microfiche files now total about 7,000 nearly identical packs of microfiche, representing an equal number of documents, neatly filed in a four-by-five card file. The problem that immediately leaps to the inquiring mind is that of indexing. How in the world, John Pleasants, are you able to rapidly locate information in a mess like that?

Well, before answering that question, I would like to apologize to any professional librarians who may be in the audience. For some reason, the description of my filing system seems to cause them pain. It does have two redeeming features, however. One, I understand it; and, two, it works.

I started by establishing several categories into which our work logically falls. These may be place names, such as James River, or Virginian Sea; biota, such as striped bass; things, such as power plants; or phenomena, such as tides, currents, or erosion. All publications are read on receipt,

assigned an appropriate basic category, and cross-filed under up to three others. A publication on the effects of power plants on oysters in the James River might be filed under "power plants" and cross-filed under "oysters" and "James River."

We also maintain an author file, in which we list not only the primary author but all authors.

We have found that these means of retrieval, however, are not enough. Consequently, we also assign descriptors from a list that is based on the Water Resources Thesaurus produced by the Department of the Interior, which has been modified for local use. We did this by removing some descriptors in which we have no particular interest — "apple trees" comes readily to mind — and adding others, mainly place names. We allow up to ten of these descriptors to be assigned to each publication. This enables us to search our holdings by computer for any descriptor or combination of descriptors. The machine will print out, on demand, all titles to which the desired descriptors have been assigned.

Should we ask it, for instance, for "York River," it would give us quite a long list. If we add the descriptor "blue crabs," it will search for those titles to which both have been assigned and give us a much shorter list. If we ask for the right-hand flipper of the blue crab in the York River, it probably won't give us anything. But that's the way we cut it down.

I felt, then, that we needed a mechanism to tie all this information together, a means to present data in a way that would make it equally comprehensible to the lay person and the scientist. The means I chose was a visual display. My first attempt was a series of nautical charts of various areas, with plastic overlays. Well, we soon found that we had so many plastic overlays, showing factors on so many charts, that it was just mechanically infeasible. There was no way to handle that amount of material.

The factors that we would consider, of course, were such things as oyster grounds, fish spawning areas, wetlands, marinas, clam grounds, sewage outfalls, salinity, and power plants. I guess you could think of 20 or 25 of them.

I came upon the idea, then, of replacing the chart and overlay system with a random-access slide projector, coupled with rear-screen projection. This has brought us a long way toward solving the problem. Our configuration has five projectors, one of which covers nearly the entire projection screen. The others cover the four quadrants of the screen. The projections of these four, in sum, cover the entire screen.

The centered single projector is used to set the stage. We show here the area in which we are interested. Then, using our random access capability, we remove that picture and replace it with pictures in the four quadrants, each of which shows the same area, but displays a different factor of the sort I previously mentioned. The effect is as though we were displaying, simultaneously, four charts of an area, each with a single plastic overlay depicting one factor. Since we have random access to these slides, we can replace any factor with another, showing it against three other factors. Our capacity, without changing carousels, is 400 slides, and carousels are pretty readily exchanged. The system is virtually limited only by the industry of our art and photographic shops.

These are the basic components of MERRMS. There are others associated with MERRMS which are not, necessarily, located therein. These include the Chesapeake Bay Bibliography, which is a listing, in several volumes, of all references to the Bay and surrounding marine areas of which we are aware. The publications listed have been assigned descriptors from the same list that we use for our microfiche file, and can be computer-searched in the same way.

We also have the data banks, next door, and these contain all the hydrographic data available at VIMS, mostly the product of our own research. Again, the emphasis is on the Virginian Sea and Chesapeake Bay area, but

other information such as fishery statistics is also available.

Having described MERRMS, I now come to the real crux of the matter, which is the question of use. How, in fact, is it working; to what uses is it put; and who are the users? To start with, we keep very accurate records of each use-visit to MERRMS. This enables us to know, and to demonstrate, exactly who is using the system, for what purpose, and at what rate.

Users fall naturally into two clases: in-house and, if you'll pardon the expression, out-house. The in-house users include nearly all the professionals at VIMS. The aerial photos, maps, charts, microfiche file, and the visual display are all used frequently. MERRMS is the scene of many problem-solving meetings of small groups, usually two or three VIMS personnel, and a like number from another organization with a marine-related problem. MERRMS is also used for briefing. Here the visual display is particularly useful. Out-house users are of many types. They include state and local officials, non-VIMS academics, environmentalists, consultants, and industrialists.

State and local officials of the coastal zone were furnished, at the start of the Commonwealth's coastal zone planning effort, with microfiche readers and a microfiche copy of a printout of MERRMS document holdings. Each month they receive an update of the list of holdings. They order those they need, and microfiche copies are sent. Both the basic list of our holdings and a monthly update of computer printouts show all descriptors assigned to each publication, as well as the title, author, and so forth. This gives perusers an excellent idea of the contents of each document before ordering.

Industrial and consultant users are particularly fond of the microfiche category file, especially the place-name categories. Here are listed all documents pertaining to any marine-related body of water in the Commonwealth in which they may be interested. It is not uncommon for these users to order 50 or more microfiche documents. They also are the most frequent users of the computer search capability for documents.

Visiting academics also use the microfiche file, as do environmentalists. Their method is generally to review the category of their subject, noting the file numbers of documents of interest. These are pulled and scanned on the reader-printer, with items of interest being copied. Occasionally, they order a microfiche copy of a document to take with them, which we make while they wait.

Another feature of MERRMS involves dissertations and theses of our graduate students. All of these are microfiched. I might add, parenthetically, they are microfiched at no charge, which overwhelms the graduate students, since they are used to paying for everything. When one of these is borrowed by another institution, we just send them a microfiche copy, instead of the usual old, dogeared loaner that many institutions send out.

This is the way that MERRMS is presently constituted. It has been in at least partial operation since 1971. For an original outlay for equipment of less than $10,000, MERRMS has provided service to hundreds of people in the Commonwealth, and, indeed, all over the nation and all over the world.

Our future plans include a computer terminal in MERRMS to give us nearly real-time access to the hydrographic data base, the computerized index of the microfiche, and other information contained in the Institute's organic IBM 370-115. We also plan to establish communications with other information bases. Further, we intend to develop a plotting capability in MERRMS.

I would like now to show you a few slides of some of the things that we've been talking about. It's very difficult, incidentally, to reproduce the effect of the MERRMS visual display. I've had a series of black and white cartoons drawn up that may help. Let's see what we have here.

First, this is a printout of the category of fisheries from the MERRMS file. You can see

that we have the author, the date, the title, the source, and down at the bottom, under the index number, we have the descriptors that have been asigned to the various publications. They give a pretty good idea of what's contained in the document. This is one of "fisheries" in the "Middle Atlantic Bight" — the two descriptors together.

The visual display usually starts off with a body of water. This, of course, is a body of water. This we use to set the stage for whatever locality we are talking about.

And then we take that off and replace it with one slide in each quadrant, as I said. Here we have the waterfowl in the upper left; we have the wildlife in the lower left, the oyster beds, and the sewer outfall.

Now we can replace the upper left. Instead of talking about waterfowl, we can show one that has to do with fisheries, and keep the others the same. Or we could remove the wildlife in the lower left, and replace it with wetlands. We could change the sewerage outfall to marine transportation, or we could change the oyster bed to water recreational areas.

That gives you some idea of how it works. I've also brought along a couple of the actual slides that we use, which give a somewhat better picture, I think.

This is a proposed third crossing for Hampton Roads. It is to be somewhere in the shaded area. Knowing this, the problem then became: What did we know about that area without conducting any further studies? This was the central slide, the stage-setter.

And then these were the quadrant slides. We had a quick and dirty idea of what the bottom was like. We had an idea of where *Mya*, the soft clams, were located. We had a picture of the general oyster area. We also had an idea where the hard clams were.

And last but not least — this will be on the examination later, so please pay attention — MERRMS stands for the Marine Environment and Resources Research and Management System.

One final question to consider is what changes I would make if I were starting all over again on MERRMS. Well, for the amount of money that we put into it, I think we did rather well. There are, however, a couple of things that I would like to change.

One, MERRMS needs more physical space. The people who are running MERRMS now have their offices in the same room the system is in. And that is difficult. There are interferences when someone wants to hold a meeting while the secretaries pack up and move next door. So that's not satisfactory.

I would like to get into the computer terminal business a bit earlier. I think it has a great future. But, of course, they're expensive devices.

All in all, I believe MERRMS has worked out quite well. Of course, there are minor regrets that one has when one looks back. I think that's true of almost everything.

Informational Needs of the Coastal Energy Impact Program

Daniel Hoydysh
Chief, Information Branch, CEIP, Office of Coastal Zone Management

I must confess that I almost didn't come here this morning. During yesterday's session I overheard someone whispering, knowingly, "The Tuesday morning session doesn't look very interesting." However, I trust this morning's proceedings have laid to rest this vicious rumor. After all, so far we've had jokes, laughter, writing on the blackboard, visual aids, audience participation, and, most important, no one has fallen asleep at the speaker's table.

I concede that big-picture policy issues are inherently more gripping than those concerning information systems. Nevertheless, with the understanding that we probably won't reach the heights achieved yesterday, or those to which we are likely to soar later today and tomorrow, I will describe my experience with decision-making, information needs, and information systems in the context of the Coastal Energy Impact Program (CEIP).

Although the CEIP is practically a household word, there may be some of you who have only a marginal understanding of this program. Some of you, no doubt, couldn't sleep last night for wondering: Am I the only one who doesn't know what a "formula grant" is? I am convinced such CEIP-induced lack of sleep accounts for the drop in attendance this morning. Therefore, I will quickly outline the major elements of this program before proceeding.

The CEIP was established by the Coastal Zone Management Act Amendments of 1976 to provide federal financial assistance to coastal states and communities. This financial assistance is to be used to mitigate adverse impacts of energy development activity in the coastal zone. An assumption underlying the CEIP is that although it is in the national interest to encourage timely development of coastal energy resources, this development must take place with a maximum concern for the fragile coastal environment. Therefore, the primary goal of the CEIP is to strike a balance between the often competing national objectives of increasing energy self-sufficiency and protecting the environment.

With some necessary simplification, financial assistance under the CEIP may be categorized as follows:

(1) grants for studying and planning for the social, economic, and environmental consequences associated with locating energy facilities in or near the coastal zone;

(2) grants for preventing or reducing unavoidable damage to valuable coastal environmental and recreational resources; and

(3) loans for providing services and public facilities, the need for which arises as a result of coastal energy development. CEIP financial assistance is authorized at a level of $1.2 billion over ten years. There are authorized some $50 million for planning grants, $750 million for loans, and $400 million for environmental recreational grants.

For the two fiscal years that we've been operating — fiscal years 1977 and 1978 — there were appropriated $7 million for planning, approximately $30 million for environmental-

recreational grants, and about $200 million for loans.

There are at least three levels at which the information and decision issue can be analyzed in relation to a program such as the CEIP. Although previous speakers have discussed this issue, I'll risk being redundant and give my own classification.

At the first level — the national policy level — one deals with very basic questions: Is there a need to create an impact-assistance program in the first place? At what level should it be authorized? At the second level — the administrative-implementation level — the issues are more pragmatic: How much money should be asked for in appropriations? At the third level — the technical-operational level — the concerns are primarily with the details of accomplishing the mission. I will focus on this operational level by discussing the decisions that were made, the information required, and the systems used to collect this information. Specifically, I will discuss the methodology involved in distributing among coastal states funds appropriated in a fiscal year for CEIP purposes.

The method of distributing, among coastal states, grants to prevent or ameliorate damage to valuable coastal recreational and environmental resources is expressly mandated by the statute. Environmental-recreational grants are to be allotted among coastal states by means of a specific formula, hence the name "formula" grants.

This formula contains four components designed to reflect the impacts created by outer continental shelf oil and gas activity. The formula is based on the amount of OCS acreage newly leased adjacent to a coastal state by the federal government, the amount of OCS oil and gas that is produced off the coast of that state, the amount of OCS oil and gas first landed in that state, and the amount of OCS-related new employment that occurs in that state. Obviously, this money is targeted for those states facing OCS development. No OCS activity, no formula grants.

Because of the specificity of the formula, the information-decision problem from a program management perspective here is marginal. We simply turn the crank. The information needs are obtained from the AISS, the Auditory Information Survey System. Some of you know it better as the telephone. We call USGS and BLM for the information we need on acres leased, oil and gas produced, and oil and gas first landed. Collecting data on new OCS employment is somewhat more difficult, since there are hundreds of firms that support the offshore oil and gas industry. Therefore, we have developed extensive contacts with industry to obtain information on OCS employment patterns in any given state.

The OCS Lands Act Amendments, now before the Conference Committee, would eliminate the new employment factor from the formula. If these amendments are enacted, 75 percent of the formula grants would depend on adjacency. As far as CEIP decision-making is concerned, this change would make our task easier. However, one can only speculate as to the appropriateness of tying 75 percent of the formula to adjacency. Off the coast of Alaska this makes sense. Off New England, where there are several smaller states and an irregular coastline that complicates determining adjacency, this formula may not accurately reflect OCS impacts.

The CEIP also provides loans for the construction of public facilities, the need for which arises as a result of certain types of energy activity in the coastal zone. The statute requires that funds appropriated for loans be allotted by formula, but the formula is not specified in the same detail as it is for formula grants. The factors that are to be used in the formula are specified, but not the relationship of the factors. These factors are the number of individuals who are expected to be employed in new coastal energy activity and the associated new population that will reside in the coastal states. These factors represent a congressionally mandated measure of the need for public facilities — a need created by energy activity.

Therefore, to compute an allotment of

available loan money, we must project both the new employment and population associated with new coastal energy activity. Again, we use industry sources to get our employment estimates. The associated new population is obtained by a simple formula that makes certain assumptions about the size of worker families and the required service-sector support personnel.

The third category of funds is planning grants for which Congress, apparently, ran out of ideas for formulae. No guidance on allotments is given, except to states to which grants will be made to study and plan for any social, environmental, or economic consequences in the coastal zones, if the consequences are associated with the construction or operation of new energy facilities. We were, therefore, faced with the problem of deciding how to distribute the funds that are appropriated for planning grants.

Since the theme of the CEIP appeared to be allotment by formulae based on need, we followed this route. First, we borrowed one of the basic goals of the Coastal Zone Management Act — that is, encouraging state participation. To accomplish this goal, each state receives a minimum amount of money so that regardless of whatever other calculations are carried out each state has sufficient funds to participate in the program. Fifteen percent of the funds appropriated in a given year is divided into equal halves among eligible states. The remaining 85 percent is allotted by a formula designed to eliminate the need for planning.

Relative need among the states is computed as follows. At the end of each fiscal year an inventory is compiled of all new energy activity in the coastal zone. This is really a unique data base, and in light of the earlier comments this morning, I make a vow never to throw it away. We'll keep it forever. We have one for 1977 and one for 1978.

Once we've identified all the new energy activity, we then compute what we call a planning-need equivalency for each energy facility on the inventory. The planning-need formula is a function of the employment associated with that facility — construction employment and operational employment — an environmental factor, a safety factor, and a planning-cost differential factor. Our purpose is to quantify, to the extent practicable, the relative social, environmental, and economic impacts associated with energy facilities.

The construction employment and operational employment are designed to reflect the need to plan for a rapid increase in population. In general, a big project with many new workers is likely to produce greater social and environmental dislocations than a small project with a small work force. There should be a positive correlation between the number of people brought into a community and the need to plan.

The formula also includes an environmental factor and the safety factor, since we are trying to estimate the need to plan for the environmental effects and safety hazards of a particular type of facility. For example, a nuclear power plant will have a high safety factor as will a liquefied natural gas facility. A coal-fired power plant, on the other hand, will have a low safety factor.

As you can see, the process of distributing CEIP funds is essentially one of information-gathering and interpretation. Ideally we would like to have a black box that would tell us where and when coastal energy activity will take place and what will be the associated environmental, social, and economic impacts. Such a black box does not exist, although more than one person was willing to build one for several hundred thousand dollars. Early in the program we made a basic decision to keep it simple and inexpensive. While our allotment techniques may be criticized as crude or inaccurate in any given case, this problem is mitigated by the fact that we are dealing with systematic errors. We are looking not at absolute impacts but rather at a means for distributing a finite sum of money on the basis of relative need. We believe we have accomplished this task with minimum administrative costs and equitable results.

Information: Fact or Fancy?

Michele M. Tetley
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When Niels West first called me and said that several of the speakers for this session were unable to make it and that he needed help, I immediately started listing names and addresses. When I paused for breath for a moment, he said he hoped I would be a speaker. In my eagerness to help him I almost referred myself out of a trip to Rhode Island. That does, however, typify the information services I've been providing for the coastal community over the years. Looking over the audience, I can see that this is no news to a lot of you, since many are what we call in the information business my loyal "user group." An awfully impersonal term for such wonderful people, but there you have it. There are a few here who have "used" me for ten years, which may not relate so much to the quality of my service as to their lack of imagination.

Information needs for decision-making: it sounds simple enough, until one tries to define what it meant by "information," or, even more elusive, a "decision." Decision-making has a nice official ring to it, but I have long had a suspicion that the majority of decisions take care of themselves. Have you ever noticed how frequently recommendations and options turn into decisions without our help?

The term "information' is just as bad, because everyone has a different concept of what information is. Most people only consider written materials to be information, and yet, in my experience, particularly with coastal management the most valuable and certainly the most sought-after information has been verbal.

Over the years I have been repeatedly asked to identify and quantify the information needs of whatever constituency I was serving at the time. It's nearly impossible, particularly at the national level, where one has a multitude of states and a mixture of public and private interest groups to respond to. Add to that the fact that the user audience has a wide range of expertise, from the old-timer to the beginner. And, too, in the fast-moving field of coastal and marine resources, new issues have a nasty habit of popping up at the most inopportune times, creating beginners out of experts on that particular subject.

Each of you, I'm sure, could give me a list of the information you need now to help solve your current problems. In most cases, today's list would be considerably different from a list made a month ago, and few if any of you know all the types of information you'll need or use in the coming year. One piece of state or federal legislation or a single new regulation can change your information needs overnight. I often wonder why legislators don't check to see if data exists before they pass laws that assume its availability. Is it any wonder that decision-makers complain about the adequacy of current information systems. On the other hand, since you expect us to be all things to all people and to anticipate your information needs better than you yourselves do, you should hear what the information community

says about decision-makers.

For the most part, any user approaching an information service has only his or her particular question in mind, and if a specific answer tailored to that particular problem isn't available, the user often questions the usefulness of the system. This assessment ignores the fact that most general information systems are designed to serve hundreds or thousands of people on a very wide range of issues. And, curiously enough, no two questions are alike, even on specific issues. This is because everyone uses information differently.

What are your information needs? Most likely, not "how many people live in the coastal zone" though one or two individuals a week still need to know. "What's in the national interest?" Check the headlines of your newspaper, there are some enduring problems — OCS, facility siting, fisheries, wetlands, for example — but last year barrier islands joined the ranks, this year urban coastal management. Tanker safety, oil spills, pipelines, ports, recreation, marine mammals, federal lands, and beach access, all rise and fall in popularity. While it's safe to say you'll always be concerned with land use, ocean management, industrial development, resource protection, and their socio-economic and political implications, that's pretty ambiguous. About the only things left out are education, crime, and the welfare system, and you'll probably get around to those.

Considering the complexity of the task of managing our ocean and coastal resources, it's no wonder that you are "information omnivores."

The comprehensiveness of these information needs does mean, however, that coastal decision-makers will never be able to look to a single information or data system to answer their questions. Indeed, it would be fruitless for us to try to develop one. What is called for is greater ingenuity on the part of the planner and probably increased reliance on information locator services. I can well understand the frustrations of the decision-maker, eternally faced with new issues, new buzz-words, and a week to develop a concept paper on a subject. I've been wrestling with your problems a long time.

Ten years ago, my first information effort was to develop a library in support of "comprehensive coordinated joint planning for the land and water resources of the Great Lakes Basin." Nothing in library school had prepared me for such vagueries. Faced with this dilemma, I decided to let the information center design itself around the needs articulated by the Great Lakes planners. I quickly learned that people were a much better source of current information than were books. I also discovered that there were a lot of small information collections in the region that were subject-specific and usually only known to a small handful of researchers. Before long I was handing out what could only be called "information prescriptions" — call these two people and if that doesn't help borrow this document from library X and if you don't feel better in the morning call me back. I also developed a reference collection of materials, but the strength of the system was the ability to tap existing resources and personal expertise throughout the region.

As most of you know, I brought that philosophy with me when, more than five years ago, Bob Knecht asked me to join OCZM and develop a Coastal Zone Information Center. Once again, there was a paucity of literature on the subject of CZM, but information and expertise on the component parts of it were scattered throughout the country, and before long I was busily linking them together.

Somewhere along the line the information community started calling this approach "networking," a term that rather reminds me of spiders, and while I like spiders, they have an unfortunate habit of eating those who stumble into their network. Let me assure you that my information networks have never, to my knowledge, been cannabalistic.

I have currently embarked on yet another information effort. Several months ago the

OCS Program Coordination Office within the Department of the Interior hired me to establish an OCS Referral Center. Initially requested by the coastal state representatives to the OCS Advisory Board, the Center was also called for in the President's 1977 Environmental Message. It was created to provide coastal state and local planners and the public improved access to outer continental shelf data and information. As the name implies, the OCS Referral Center will primarily act as a switching station. I am in the process of familiarizing myself with the various OCS issues and the individuals who handle the component parts of this extremely complex operation. While, initially, I am concentrating on the Department of the Interior, I will also be establishing contacts and identifying resources in other federal agencies, the oil and gas industry, and state government.

On January 27th, USGS and BLM published regulations on oil and gas information programs. In time, the summary reports and indices called for in these regulations should provide us all with better tools for understanding activities on the outer continental shelf.

Not surprisingly, I have discovered that there is a wealth of information and data existing on OCS matters. It is, however, scattered among agencies, offices, and individuals, and unless you know who to talk to and what to ask for, it is easy to end up empty-handed and frustrated. I should point out that federal employees have a lot of difficulty identifying and locating information too, so state and local planners are not alone in this dilemma.

Still another information effort, designed to aid planners and the public, in current terminology, could be called "coastal cloning." It is an attempt to replicate, regionally, the types of information services provided through the Coastal Zone Information Center and EDS in NOAA and through the OCS Referral Center in Interior.

Two years ago, three NOAA offices, OCZM, Sea Grant, and Environmental Data Services, combined their resources to establish a system of Regional Coastal Information Centers. Operated through Sea Grant's Marine Advisory Service, these information centers are designed to provide a regional specificity that cannot be accomplished at the national level. Linked to the national programs, they can tap considerable data resources and ultimately should provide an invaluable interlocking regional information network. There are currently three in existence; in the Pacific Northwest, the Great Lakes, and the original one, for New England, which is operated here at URI. These centers are information locaters, facilitating the communication and transfer of pertinent coastal and marine information and data throughout the regional coastal community. They are designed to make your job a little easier.

The major distinguishing characteristic, in providing information services to decision-makers, seems to be the universal need for a speedy answer. At OCZM I learned to view a 24-hour lead time as a godsend. I also discovered that my fast responses only encouraged shorter and shorter turnaround time expectations. Not exactly positive reinforcement.

It should be pointed out that fast turnaround information services, of the type I have provided over the years, depend heavily on the more formal library collections, archives, data banks, and other fancy but ponderous information systems. Their complexity and specificity is necessary to capture and retrieve the vast amounts of data our society generates on any given subject. Their very structured format, however, precludes responding speedily to new issues or developments. While these systems are valuable for in-depth research in established subject areas, they are no use at all for current awareness.

It is important, therefore, for the decision-maker to know what to expect and what not to expect from any given information system. Some are informal, and therefore more flexible and responsive to new and ever-changing needs; others are more structured and less

flexible, but also play a valuable, though more specialized role. Most requests require a mix of information types — a few experts, a few documents, and guidance on a relevant data base or ongoing research project.

There's a lot of coastal and marine information around, in Washington and throughout the country. It does, however, take imagination and tenacity to find it. A number of speakers have indicated that we need more data and information. This is true, but I would argue that perhaps what we need more are people trained to use the existing information. People who know how to manipulate it, and reformat it to meet their own particular needs.

Information and data represent raw materials that can be used to create an infinite variety of "end products." It is the responsibility of the decision-maker to fashion these building blocks to his own design. We live in a prepackaged, ready-made society, and we have come to expect relevant information to be as easy to order as a Big Mac. Unfortunately, our information needs are more sophisticated than our tastebuds.

Periodically, there are recommendations to create gigantic data bases or collections which could supposedly answer all questions on a discipline. I suggest that your time and money is better spent identifying and utilizing the resources where they presently exist. Communication and cooperation between individuals and institutions create useful, yet inexpensive information linkages.

Few coastal planners have the luxury and time needed to document the successes or failures of any particular approach or technique. And yet how can we expect the discipline to mature if these experiences aren't communicated? Certainly, a select number of you attend several national meetings a year, where, let's face it, the most useful information is exchanged during the breaks. But how many local planners can come to these conclaves, how many are even aware of them? The responsibility, then, for communicating the state of the art, current issues, and who's doing what frequently falls to the information brokers. The service, however, is only as good as the input the coastal community provides; you've got to give, to get — an "information cooperative," so to speak.

Because of the nature of my work, I myself am an "information user." I use people, I use libraries, data banks, research programs, draft reports, gossip and hearsay, just about anything I can get my hands on. I am a great supporter of Ma Bell, Xerox machines, and, the U.S. postal service. Those of you who know me know too that I'm an "information pusher." I frequently send things out, not because you've asked but because I think you should have.

As a user, I'll admit that any of our individual information systems are far from ideal. I think this is, perhaps, not the system's fault so much as the user's. Asking any system to do something it was not designed to do creates problems. You don't call a library to find out what happened on the Hill yesterday. You don't use a data bank to get a copy of last week's magazine article. You'd be surprised how many people don't know how to begin to look for information.

We find that traditional approaches to planning and decision-making frequently don't work for the volatile and dynamic area of coastal and marine resource management. Neither do some of the data and information sources which have served us well in the past.

There is no magical shortcut to developing coastal management plans, and there is not, and probably never will be, a quick fix for solving your information problems. A lot of new services have been created in the last few years in response to state and local planning needs, but now it's your responsibility to learn to use them.

PERSPECTIVES ON PUBLIC OPINION AND ITS IMPACT ON POLICY

Walter Gray, *Session Chairman*
Division of Marine Resources, University of Rhode Island

The Experience of Public Interest Groups in Affecting Governmental Decisions on Marine Policy

Sarah Chasis
Senior Staff Attorney, Natural Resources Defense Council, Inc.

I would like to address today the role of public interest groups, such as the Natural Resources Defense Council, in the formulation of marine policy: the means that we utilize to affect marine policy; the successes and failures that we have had; and the limits that we have observed in the formulation of rational decisions in the marine policy area.

The function of public interest groups has been accurately described by John R. Quarles, Jr., former deputy administrator of the U.S. Environmental Protection Agency:

> Business organizations interested in, or affected by governmental action are ready and able to follow governmental actions closely and use all of the legitimate opportunities for presenting their position forcefully. By contrast, there typically is no one actively on the scene to represent the broader public interest in following the activities of government on a daily basis and subjecting such activities to the constant challenge of constructive criticism.

This is, certainly, a role which is needed in the marine area, where there are many industrial groups, such as oil companies and mining interests, working effectively to have their interests reflected in government decisions.

The role that we see ourselves playing, therefore, is assisting government in performing its duties under law. We see ourselves as enforcing the laws which were passed by Congress, rather than ourselves formulating policy. We seek to ensure that laws designed to promote environmental protection are in fact interpreted and implemented so as to fulfill Congress' intent. This includes ensuring that the long-range view of the impact of activities on natural resources is taken into account in government decisions.

We do not pretend to be the final arbiters of marine policy. We see ourselves as an interest group playing a role in the formulation of that policy. The means by which we seek to affect marine policy are as follows.

Once a statute affecting the marine environment is enacted into law, we work through the administrative process to ensure that the law is effectively implemented. The use of administrative proceedings is critical; we comment on agency regulations and participate in adjudicatory hearings.

Where agency regulations or the actions taken with respect to particular projects are not in conformity with the law, we challenge these actions in the courts. Litigation has been one of the most effective tools utilized by public interest groups. It is an essential avenue of action. It is the ultimate weapon which ensures that agencies adhere to their legislative mandate. As a result of the many successes public interest groups have had in litigation, these groups are now taken more seriously in administrative proceedings.

In summary, public interest groups play a very important role in counterbalancing other interest groups. We ensure that the decisions that agencies make are based on consideration of broader interests and that these agencies adhere to their legislative mandate rather

than bow to the pressure of special interest groups.

The effectiveness of public interest groups is affected by a number of different factors. The extent to which the interests that they are promoting overlap with the interests of other groups, such as state and local governments, is one such factor. For example, in the area of offshore oil development, there has been a great deal of overlap between the interests that we seek to protect and those that coastal states and local governments seek to protect. As a result, we have had a lot more success in attaining our goals than we otherwise would have had. We try to work toward building a broad coalition of interest in recognition of this fact.

The nature of the statute that we're working with is also of critical importance. Where a statute is specific and provides clear directives to agencies, we find that we are much more effective, because we can point to a clear legislative mandate. Where statutes are amorphous and their purpose unclear, we find we have a much more difficult time. The Coastal Zone Management Act is an example of legislation which is subject to a great many interpretations. I feel that, as a result, the effectiveness of public interest groups under that program has been substantially less than it might otherwise be.

Where foreign governments are involved in the formulation of marine policy — which is often the case — we find that our effectiveness is severely circumscribed. This is something we can see in terms of tanker regulation. Our own government is holding back from promulgation of strict tanker standards because of the pendency of ratification of international tanker standards. We, as domestic interest groups, are much less able to affect policy in this area.

Finally, public interest groups also face difficulties where they are pressing for consideration of long-range, nonquantifiable values in marine policy decisions, as compared to short-term quantifiable economic gains.

I would like to illustrate some of the general points I have made by discussing the role that the Natural Resources Defense Council has played with respect to two specific marine programs. The first is the federal coastal zone management program and the second is the offshore oil and gas development program.

What we have tried to do in the coastal zone management program is work with both the federal government and the coastal states to ensure that the program is implemented in a conservation-oriented manner and that the state programs really serve to protect coastal and marine resources. At the federal level, our efforts have focused on the regulations that set the standards by which the federal government judges individual state programs. In our review and comment on these regulations, we have sought to press for inclusion of four things.

One is the primary conservation thrust of the Coastal Zone Management Act. The Coastal Zone Management Act does not encourage planning for planning's sake. Rather, the act was passed in recognition of the fact that thoughtless development was destroying vital coastal resources. Unless those resources are going to be protected by the planning efforts of states, the entire coastal zone program will have been a failure. Thus, we seek to have much greater emphasis placed on this conservation thrust of the Act in the federal regulations.

Second, we are urging that it be made clear in the regulations that NOAA will review state programs against certain substantive standards rather than just to see whether a state has gone through a number of procedural steps.

Third, we seek to ensure that the regulations require that programs are based on adequate information, including an inventory of coastal resources and uses, and that the management decisions are based on an analysis of the capability and suitability of these resources for development. States must recognize and regulate development in the

coast with an understanding of the integrity of natural systems. Too often what we see is states piecemealing together existing management programs which are oriented toward one particular resource, or one particular kind of activity. No thought is given to the relationship between different coastal resources or activities. We are seeking to ensure that the regulations place increased emphasis on this.

Fourth, we believe the regulations must reflect the act's recognition that the institutional structures which exist in many states are inadequate to control coastal uses effectively. Therefore, states must be encouraged to develop new and more effective means of controlling uses, rather than merely relying on what they already have.

At the state level we have participated in the development of the individual programs. In so doing, we have attempted to work closely with local and state environmental groups, fishermen, and others interested in the development of effective programs. We have tried to bring to them an understanding of the federal law and its requirements.

Rhode Island's coastal zone management program is one which NRDC has worked with, and, I think, had some effect on. The Rhode Island coastal zone management program was due to be submitted to the federal Office of Coastal Zone Management two years ago. That office felt that the state had done an adequate job. At the public hearing held on the state's program prior to its submission to the federal agency, NRDC and other environmental groups presented extensive testimony criticizing the program.

For example, we felt that the standards proposed to judge development in key coastal areas were vague and inadequate to ensure effective resource protection. In addition, the program failed to ensure that the cumulative impacts of small-scale development in the coast would be adequately controlled.

In large part as a result of the position of the environmental groups, the program was not submitted for federal approval. Instead, Rhode Island went back and spent an additional year strengthening its program before it was submitted for federal approval. When it was submitted, it had the support of the environmental groups, including NRDC.

NRDC's work under the Coastal Zone Management Act, I believe, served as an important counterbalance to the efforts of industry groups such as the American Petroleum Institute and the Edison Electric Institute. These interests are trying to turn the CZMA into an energy facility siting law. NRDC, which is the only national environmental group monitoring the program, has, through its review of the regulations and state programs, served as an important counterinfluence to those interests.

However, there are very significant limits to the effectiveness that we, as a group, can have. Certain of these limits derive primarily from the nature of the program itself. It's a voluntary program. The incentives, while they exist, are really not that substantial. As a result, the federal agency responsible for implementation has taken a lax approach to implementation because it fears that the states most in need of coastal protections would drop out of the program if it were too vigorously enforced. The "something is better than nothing" approach is being taken.

NRDC has also concentrated a great deal of effort on the outer continental shelf oil and gas drilling program. I think that program has improved significantly only because of the confrontations which occurred between the public interest environmental groups, states, and localities on the one hand, and the federal government and oil companies on the other. We are now seeing a number of administrative reforms occurring in response to the criticisms leveled against the program in the numerous lawsuits challenging the accelerated leasing program. For example, the Interior Department is promulgating regulations which would permit the secretary to terminate leases if significant environmental threats exist in the leasing areas, and a reformation of the Environmental Studies Program, which has come under severe criticism from not only environ-

mental groups but organizations such as the National Academy of Sciences and several members of the scientific community.

Thus, the tools which were used by NRDC, particularly litigation that was brought, have played an important role in reforming the leasing program. It is still far from what we would like to see, but it is an example of how advocacy by public interest groups can play an important and valuable role in the formulation of marine policy.

Public Opinion and Its Impact on Policy: The Experience of the President's Reorganization Project

Jack Willis

Natural Resources/Environment Division, President's Reorganization Project

I have been asked by Bill Harsch to express his deep regret at not being able to be here to discuss public opinion and its impact on his study. He had to stay in Washington to meet with the President yesterday for an announcement of a reorganization plan to establish a Federal Emergency Management Agency. And today and tomorrow he's going to be tied up on the Hill with the OMB Director, Jim McIntyre, testifying before the Senate Operations Committee today and the House Government Operations Committee tomorrow. So I will try to fill in for him and do the best I can.

I have, of course, been working with the President's Reorganization Project for about six or seven months now on detail from NACOA. So I am pretty familiar with the work that has gone on there.

I would like to point out, first, that the President's Reorganization Project has under study about 20 to 30 different efforts. The effort on which I am involved is natural resources and environment. The study that resulted in the Emergency Management Agency is another study that was under the direction of Bill Harsch.

Today, however, I am going to talk primarily about the Natural Resources and Environment Study. It is typical of the other studies that are being conducted in that it is designed to maximize input from the public. In the past, many reorganization studies were conducted in such a way that the public, in general, found out about it after recommendations were made to the Congress. This has not been the case with most of the studies which are being conducted by the President's Reorganization Project in general, and by Bill Harsch in the Natural Resources and Environment Study in particular.

I believe the first document that was publicly distributed was a copy of the Study Plan. I am sure that many of you have seen it. It laid out, very carefully, the kinds of analysis that the study would engage in; namely, the schedule and the fact that public participation was invited. The next document that was distributed was what we call an Options Paper, which was printed in the Federal Register. It requested comments from the interested public on the options that were described in that document.

In addition to the information requested in the Federal Register, several meetings were held with various interest groups throughout the country. We had meetings here in New England with the regional representatives of the various federal agencies, representatives of various interest groups, and state and local officials as well. In New England, in Denver, in Seattle, in Texas, and Louisiana, meetings were arranged with people who were concerned with natural resources and environmental problems.

The study itself was concerned with programs which are conducted by the Department of Interior, the Bureau of Land Manage-

ment, the United States Geological Survey, the Forest Service, some of the activities of the Corps of Engineers, and NOAA in the Department of Commerce. We attempted to take a comprehensive look at how the government was managing its responsibilities in natural resources.

The deadline for a response from the public was extended for 30 days. It may have been because we didn't realize that there would be so much interest from the public. Also, we initially intended to have only 30 days for response, but it was over Christmas, and that, obviously, wasn't quite time enough. Therefore, the deadline for public response was extended for 30 days for formal response, and, as of this date, the actual cutoff date has not been reached. The analysis has been completed on the study. However, the President has not yet been briefed, so there is still opportunity for input from groups like this, or from other public interest groups, to influence the direction of the recommendations that will be made and the action that the President will take.

I'd like to spend just a few minutes to say something about the response from the public. We got approximately 2,200 letters, or communications, and documents, from the 50 states and territories. We got 22 percent response from, would you guess, federal, state, and local governments. Twenty-two percent we categorized as being received from private citizens, citizens who were not identified with a particular agency or group. We got 16 percent from what we considered the academic community, professional, and conservation groups. Eighteen percent of the total responses were from business and industry representatives, and a rather surprising 21 percent from soil and water conservation districts.

What this told us was that the soil and water conservation districts had said to their people, "You know, this may impact you adversely, you'd better say something fast." I think there is a lesson here: if there is an issue that is of importance, it is well to let people who represent similar constituency know so that they can respond. This has made an impact on the course of study — the fact that these people took time and effort to send in comments.

We've also heard during the course of the discussion these two days that people are getting discouraged. They feel that maybe input from the public does not reach high places. Well, I think that the President's Reorganization Project is pretty highly placed. And it is really true that the inputs that we have received have influenced the course of the study.

One of the things which was perhaps embarrassing to me, since I have come to the study from close association with the ocean community, was that there was a relatively small response from people who could be identified as the ocean community or ocean constituents. It's difficult to determine the reason for this. Maybe the people in ocean areas, or those concerned about ocean affairs, felt that there was no real need.

However, several people did comment. And, in fact, one of the people here wrote a letter to the PRP and said, if I may quote from Stuart Nelson, "A considerable part of the problems and dissatisfaction concerning federal oceanic atmosphere activities may stem from the duplication of services and products."

Stu at the time was president of the American Oceanic Organization, and was writing in behalf of that group. We also got comments from the League of Women Voters, who pointed out the same kind of thing — that ocean affairs and programs were scattered in various agencies.

Another interesting comment we received was from Jacques Cousteau's organization in New York. I am not sure who wrote this, but it said, "Ocean matters involve such various agencies as NOAA, EPA, HEW, FDA, etc. It is often constructed for one such organization to present policies, which are substantially different from those of the others."

Since this was written, the American

Oceanic Organization had an opportunity to hear Jacques Cousteau in Washington. It is his view that fragmentation is not so bad; maybe, in fact, we should continue having marine affairs scattered in different agencies so that there will be many funding sources, and we will not have a monolithic group.

Most of the response came from people who were afraid that a change would be made and were opposed to the change. I think that this, perhaps, is typical of the responses that have been received, not only by the Natural Resources Study team but by the other study teams. When it becomes known that there's a possibility for a major change in an existing structure, many people get very nervous and react negatively to the proposed change.

I think that this kind of syndrome exists with the Natural Resources and Environment Study. But part of the problem is also that the study itself has been constrained in really giving the public exactly what the detailed options were.

The feeling had been that there was a desire not to cut off any options that the President might have. And after the initial interaction with the public, which stopped about two months ago, there has been really very little information from the PRP and the Natural Resources Study to the public. There remains in many of your minds, I am sure, questions as to just what the details are of the options that are currently being considered.

I still am not able to say when we will have details — hopefully soon. The announcement yesterday of the reorganization plan on federal emergency preparedness, I think, shows that there is some action. But the main thrust that I want to leave with you is the fact that input from the public, particularly with this Administration, is very important. It is definitely taken into consideration and reaches the highest levels.

Sample Surveys and the Formulation of Resource Policy

Robert W. Marans and Sandra J. Newman

Survey Research Center, Institute for Social Research, University of Michigan

The topic Dr. Marans and I have been asked to address today is central to our interests. Although we currently teach and conduct research at the University of Michigan, we previously served as staff planners in local and regional government agencies, and experienced firsthand the frustration of setting objectives and designing policies without any real sense of the people whose lives would be most affected by these decisions. Typically, census data or other readily available demographic or economic tabulations would be consulted, but invariably these data were out-of-date and, more important, could reveal little, if anything, about perceptions, attitudes, and behaviors unless the most heroic assumptions were invoked. This frustration with the lack of solid information about potentially affected population groups is at least part of the reason we are currently playing a different and somewhat unique role in the planning process — that of working with decision-makers to design and undertake systematic sample surveys of relevant populations, in an attempt to improve the reliability of information bases for policies which are formulated and the effectiveness of decisions which are made.

Our experiences in recent years in conducting surveys for decision-making bodies have been at the local and regional levels. We would like to share some of these experiences with you and at the same time present some general thoughts which are central to the theme of this session.

First, we will outline several approaches to ascertaining public opinion on policy-related issues and discuss some of the advantages and limitations of each. Next, we will introduce some types of information that can be derived from sample surveys and their potential uses. Examples from our past and current work will be cited. Finally, in order to dispel the notion that we view the use of surveys as the best way to answer all questions, we will discuss some of their limitations and the conditions under which their use would be inappropriate.

Approaches to Ascertaining Public Opinion

Public Hearings and Community Participation

The public forum or public hearing is probably the method of ascertaining public opinion with the longest history and the most widespread use. In seventeenth-century New England, the town meeting was a forum for discussing common problems and proposed legislation; today, a wide variety of legislation, ranging from federal community development block grants and the Land and Water Conservation Act to local planning and zoning decisions, is required by laws and charters to be reviewed and debated in open, public

This paper was delivered by Ms. Newman.

meetings. Any individuals who have something to say can state their case as they see fit; the only requirement is that they confine their comments to a five- or ten-minute time limit.

In those instances where there is a sharp division within the community about the best decision to be made, and considerable resources are to be gained or lost by the various parties involved, the public hearing becomes a sophisticated tool for influencing public policy. Careful organization of interest groups, solicitation of expert testimony, and articulately presented arguments can be observed in even the least urbane jurisdictions.

Implicit in this evolution of the public hearing are some of its limitations as a primary way of getting at the views of the populace. What about the less articulate members of the community? Or those with scarce resources who cannot afford to hire experts, or who cannot afford to take the time to attend the hearing, or who do not have the means to get there? These are some of the concerns that generated the advocacy planning movement of the last decade, as well as the less "revolutionary" effort to open up the process by venturing out into the community and holding smaller meetings in neighborhood churches and community centers, which tend to be less awesome environments than a city hall.

Similarly, there have been attempts to learn about public attitudes by organizing small groups into role-playing and gaming sessions. Advocates of gaming believe that the true values and desires of people, as well as their sentiments concerning a particular issue, are more likely to be ascertained via the gaming sessions than through more formalized public hearings.

But these approaches, too, are limited by the number of people who choose to participate and who can be reached, not to mention the representativeness of those who do participate. It is difficult, then, to feel confident that the range of views aired at public hearings represent the range of views held in the community of concern.

Surveys

If designed and implemented carefully, sample surveys can provide more systematic and representative information about the public. The recognition of the greater reliability and legitimacy of data collected in this manner probably has contributed significantly to the increasing use of survey methods by public agencies and to the incorporation of a survey component in the planning process of many public bodies. But the words "sample survey" are really generic terms which encompass a wide variety of studies, designs, objectives, implementation procedures, and so on. Indeed, a recent pilot study undertaken by the American Statistical Association to assess survey practices and data quality in surveys of human populations discovered great variation in sample design, questionnaire construction and format, quality control over data collection, coding and processing, and virtually every other facet of a survey-based study.[1]

What is most important to appreciate, however, is that the ability to answer the questions which motivated the survey in the first place rests heavily on the manner in which the survey is designed. The recent history of survey use by planning agencies demonstrates this point quite vividly. In the early days of 701 planning, consultants would try to identify the opinion leaders in the community and would arrange to interview them. Usually, these "influentials" were bankers, business people, union leaders, industrialists, and elected government officials. Their views about a range of issues, including such topics as the types of community services and facilities people wanted, the most desirable places to live, and how resources should be utilized, were assumed to represent the views of the community at large and were often adopted as the basis for a broad set of planning decisions. Typically, the interviews were unstructured, often taking on the form of a conversation. Questions were set forth as a basis for discussion, but were not necessarily consistent in

wording, order, or even content for all individuals who were interviewed.

To the surprise of many planners and community leaders, proposals resulting from these discussions often met with resistance. When plans became known to the public, either through the media or through public hearings, objections were raised, often trenchantly, that the plans did not represent the real interests of those whose lives would be most directly affected by the proposals.

While discussion with community influentials remains a helpful way of exploring some issue areas from the vantage points which these individuals represent, planners have increasingly realized the need for a much broader base of information in order to accurately reflect citizen needs and aspirations.

One approach to ascertaining public opinion via surveys is to make inquiries of people most directly associated with the issue. In the case of resource policy, users have been the most notable group whose views have been sought. Several examples can be cited.

In attempting to deal with the problem of user conflicts on rivers, the U.S. Forest Service has sponsored a number of surveys designed to obtain use information and the perceptions of canoeists and fishermen found on the rivers. Often supplementary surveys have been prepared as a means of identifying the views of riparian property owners and resource managers as well. Similarly, local agencies have conducted on-site surveys in parks and on lakes to elicit directly from participant groups their preferences for alternative development plans and proposals. At the same time, on-site surveys have been used to assess the increases in satisfaction or the fulfillment of needs of individuals or groups as the result of a specific action.

In another context, studies of public services have often been based exclusively on the users of those services. The reliance on on-board surveys of riders in public transit studies to identify aspects of the service needing improvement is an excellent example.

While user surveys may have an important role to play in the formulation of public policy, they suffer from some serious limitations. The most obvious problem is that they give a one-sided picture of the issue under study. While it is important to know how individuals enjoying a variety of recreational activities on a particular lake site evaluate that environment, it may be equally important to know why others who had once used that site no longer choose to do so. User data alone cannot answer this question. Moreover, user data provide an inadequate base for projecting future demand. Very often participation rates at a particular recreation facility, for example, have been used in this way. But data on users reveal nothing about the latent demand which may exist in the nonusing public and which should be taken into account as well. Similarly, data covering prospective participants in a governmental program could expand the policy options of decision-makers, who might otherwise rely only on information supplied by current program recipients.

Surveys of members of households, using probability sampling techniques, offer an opportunity to tap the views of nonusers as well as users of recreational and other resources and programs. In brief, probability sampling is a method for choosing a sample that reflects the variations that exist in the population. Thus, such samples are representative of the entire population and enable the analyst to estimate the error associated with the sample statistics. The survey itself can be conducted by mail, over the phone, or face to face, and can produce substantial information on the attitudes and behaviors of the populations of interest to the policy-makers. For example, a better understanding can be gained of the population "at risk" in relation to a particular decision, and this understanding may influence the shaping, or reshaping, of that policy.

Survey instruments can also be designed to test the level of support which might be generated for new policies not yet imple-

mented or even publicized. As such, a survey can serve as a quasi-referendum and, when used over time, can monitor changes in public opinion. And, of course, surveys can be used to measure the extent to which the objectives of a policy already implemented have been accomplished.

One important use of household surveys revolving around any number of planning or policy issues is the identification of problems. It has been demonstrated on numerous occasions that the concerns of the public are not always understood by decision-makers. More often, a set of problems which are readily identified by both the public and decision-making bodies are not ordered in the same manner by both groups, nor by all segments of the public. For example, in our survey of permanent and seasonal residents of inland lakes and rivers in two northern Michigan counties,[2] we found that problems considered to be critical by local planners and county officials were viewed as serious by only a small proportion of the sample. At the same time, issues that were thought to be of little concern to citizens were mentioned with surprising frequency. And, to further complicate matters for local officials, there were sizable differences in the rank orderings of problems among residents living or visiting the different lakes or rivers. To illustrate, fluctuating water levels was by far the most serious problem on one of the fourteen lakes under study: one out of every three residents mentioned it; it was mentioned by 15 percent of the residents on two other lakes, while on the remainder lakes fluctuating water levels was hardly mentioned at all. On the other hand, poor fishing was viewed as the number-one problem by residents of all lakes except two. What these data suggest most clearly is the need to gear policies and approaches to resource management within a region to the requirements of local situations.

Surveys have also been used to identify and understand the preferences of people. They have been employed by park and recreation agencies to establish priorities on the kinds of programs and facilities their constituencies want, by state planning agencies to learn about the kinds of communities people want to live in, and by behavioral researchers in identifying the choices people make in housing, jobs, leisure pursuits, and the like. Regardless of whether questions of preference are asked in an open-ended format or as simple "yes-no" questions, they can be criticized as providing potentially unreliable information because they lack the constraints on choices which are always present in the real world. Primary among such constraints, of course, are the costs associated with alternative choices. In our work in northern Michigan, we attempted to place our questions in a more realistic framework by using a trade-off format.[3]

We knew, for example, that economic development was viewed by permanent residents as being important to the future of the region. It was also clear that these people felt quite strongly about the need to preserve the region's high quality environment. People who held these views were faced with a dilemma. On the one hand, they wanted to see growth and economic development continue, particularly those types of development which produced jobs or otherwise stimulated the economy. On the other hand, they were aware that such development could be detrimental to the environment. In order to examine the choices people would be willing to make when faced with situations characteristic of these dilemmas, a series of trade-off questions was asked. In order to set the stage for these questions, the proposition that jobs were important was tested and found to be correct — more than nine out of ten respondents opted for job-producing development in the region. Then a trade-off question was asked to determine their willingness to accept a lower quality of lake water as the cost of attracting jobs. When faced with the trade-off situation, almost half of the respondents who initially opted for jobs changed their minds when it meant poorer water quality. Similarly, a third of those who selected the large plant were

willing to forego that development if it meant subdividing farmland. And about one-fourth of the respondents wanting job-producing development said "no way" if it meant an increase in property taxes.

Although trade-off questions represent one method by which reality can be more closely simulated in a survey, they, too, represent an oversimplification of the context in which decisions are actually made, be they personal decisions or public-policy decisions. But at the same time the need to simplify may be an advantage because it demands that the researchers have extremely clear notions of the precise questions they are trying to answer.

Survey studies, like many other research methods, are most likely to succeed if they begin with specific hypotheses to be tested and an organized structure in which to test them. Nevertheless, while having some clear purposes in mind is a necessary condition for survey work to be useful, it is not sufficient.[4] There are some studies which have clear purposes that are not best dealt with by conducting a survey. For example, if one is interested in generating some aggregate estimates, especially of skewed distributions where a small number of people account for a large fraction of the aggregate, surveys are not the best route to take. They are also not the best way to study illegal or illegitimate activities, since it is difficult to believe that respondents who participate in such activities would report truthfully about them, even with the promise of confidentiality. Finally, surveys tend to be difficult to use in studying rare events or phenomena, primarily because sampling of such respondents is extremely costly in time and money. And, of course, where the relevant population is unknown, such as the future users of a new water-oriented park, the usefulness of a survey to determine user needs would be greatly limited by the accuracy of the guesses as to who those users would most likely be.

A very different class of problems results from the fact that it is human beings who are the subjects of survey studies. For example, stated attitudes do not often predict eventual behaviors all that well; some people like everything, so that their positive reports about a topic of interest may be difficult to interpret; and some people have a hard time remembering the way they felt about some issue in the past and either selectively remember only the good things or rationalize away the bad.

As we have seen, then, while survey research has special advantages, it has its shortcomings as well. But these shortcomings have not gone unnoticed by the scientific community. Many psychologists and sociologists at the Survey Research Center and elsewhere devote considerable time to learning more about the cognitive and perceptual processes which are so central to survey research. And, on a more mundane level, great progress has been made in reducing time and money costs usually associated with survey, through such techniques as random-digit dial telephone sampling and interviewing, direct data entry, and highly efficient computer programs. If the momentum of the progress achieved in reducing costs and turnaround time over the past decade is sustained, the prospects for additional improvements in the future look bright. In the meantime, social surveys can play an effective role in generating information about people as part of the decision-making process.

Notes

1. Barbara Bailar and C. M. Lamphier, *Development of Survey Methods to Assess Survey Practices* (Washington, D.C.: American Statistical Association, 1978).
2. Robert W. Marans, John D. Wellman, Sandra Newman, and John Kruse, *Waterfront Living: A Study of Permanent and Seasonal Residents in Northern Michigan* (Ann Arbor: Institute for Social Research, University of Michigan, 1976).
3. The trade-off questions were used in the second phase of our northern Michigan work. See Robert W. Marans and J. D. Wellman, *The Quality of Nonmetropolitan Living* (Ann Arbor: Institute for Social Research, University of Michigan, 1978).
4. A concise description of some inappropriate uses of surveys can be found in John B. Lansing and James N. Morgan, *Economic Survey Methods* (Ann Arbor: Institute for Social Research, University of Michigan, 1971).

Discussion

Mary Kilmarx

Chairman, Rhode Island Joint General Assembly
Committee on the Environment

After spending most of my life in smoke-filled rooms, it's a great treat to have a chance to come down to this beautiful Bay Campus. I really am delighted to have had a chance not only to hear our speakers this afternoon, but to have the excuse to make myself spend some time thinking about public opinion, and about the making of public policy. Mostly, when you're busy you're the politician, not the political scientist, and you do it out of a kind of gut reaction, without analyzing it. So I really enjoyed spending some time thinking about this subject.

There were some attempts in the discussions to define public opinion. But it occurred to me, in this conference devoted to ocean management, that perhaps the best analogy would be that it is like an octopus. You grab hold of a leg here and there, wherever you can, but it is very hard to really get hold of the creature.

Since we are each going to deal with the subject from the point of view of our own perspective, I'd like to spend a couple of minutes talking about something a little different from what the other speakers did — that is, the people who are involved in putting together public policy, the human element. Because I think all of us know that you can draw charts and maps, and talk about plans, but decisions are made by people reacting in very human ways to problems. We could tell you tales that would curl your hair about Rhode Island, and why we have different kinds of policies in different areas, because of the people who were involved. The chemistry of the political process is terribly important in the creation of public policy.

A book called *The Scientific Estate* offered a concept that I found useful in understanding what needs to happen to achieve public policy through means that are good, that are sound, that are effective. Its author suggested a continuum, with knowledge at one end and power at the other. At one end there are scientists, professionally trained people, who are seekers after truth. At the other end are politicians, who exercise the power but who do not need expertise or academic training to obtain elected office. In the middle, somewhere, are administrators. It has been useful to me to think about this continuum, and to think about the fact that what you really need to do is achieve just the right kind of mix between those kinds of people, to get a collaboration between those who are capable of developing policy, in its substantive aspects, and those who are capable of seeing it enacted as legislation, and of ensuring that the policy meets what they perceive to be the public interest.

Legislators and politicians must not get very far from what is, in fact, the public interest. They have a stake in perceiving it correctly. If they don't, they won't be there very long.

C. P. Snow had a similar concept when he said that to be any good a scientist has to think

of one thing, deeply and obsessively, for a long time. The politician — I'm going to put that word in; that wasn't the one he used — has to think of a great many things widely, in their interconnections, for a short time. There is a sharp difference between the intellectual and moral temperaments of the two.

I think the most valuable thing, or the thing that interests me the most about public policy-making in environmental areas, is moving something from the idea stage, where a few people — the experts, not well integrated, perhaps, into the social system — are involved, and taking it from there to a place where it is accepted, has sufficient acceptance, not only to be enacted legislatively, but actually to be popular, to be accepted by people. You need both kinds of people that I described to do that. You need to develop not mutual antagonism, which so often exists, but mutual respect for each other's capacities. You need them both. And you need some good middlemen who can translate to each other. But you really do need to forgo a partnership, so that we get politicians, who go about just superficially sprinkling our goodness here and there, and those who hit the books and write the stuff up and make it good, and get everybody working together.

I think the reason that I was asked to come here was because this was something that we did do in Rhode Island this winter. We have often done it in other subjects. But this land management bill that I was involved in was, I think, a good example. Its two authors are sitting right there. I think that we did achieve, through a long series of public hearings, a piece of legislation which reflected the expertise which they initially brought to the writing of the bill, and a sense of what people wanted — or of what the people would put up with, if you want to put it that way.

In the last analysis, the process actually improved the legislation. And that was very interesting. I think that this is analoguous to legislation relating to oceans as well as to land. In my own view, when we started, what we were trying to do was a selling job — taking the goals which we saw and the mechanism which we developed and trying to achieve public acceptance of them. What we got was a two-way process, in that when we found where the sticky places were and worked on them harder, we got something that was even better, perhaps quite a bit better than what we had started with. It was essential to do that, because then the acceptance was much broader. (It wasn't broad enough, and we will spend the next year working on that). But, at any rate, I think that process — the hearing process — was a very useful one.

I would agree with Sandra that you have to get to where people are. And you have to go out into communities. You cannot just use central points, like the Statehouse. You have to really reach people. If you want grass roots, you've got to get out where the grass is.

I don't think a survey would have been appropriate to reach the articulate public. That is the public that it is necessary to reach. I think you need to go a great deal further than simply taking the temperature of the public, which is, in a sense, what a survey does. I think that the implication is that your policy is going to reflect what you hear, that, obviously, you're going to do what the people want, because they are telling you.

The last point I'd like to make is that with this mix of the kinds of people that make policy, what you are really trying to get is leadership, not just responsiveness. At the same time that you are listening to what people are telling you, you also are taking them much farther than they thought they could go. They know the kind of state, the kind of coastline, etc., that they want for their own personal lives. But you try to take them into the sophisticated mechanisms that will achieve it for them. And that's leadership. That's what I call statesmanship.

Charles D. Matthews

President, National Ocean Industries Association

I have sat here today with a great deal of interest and listened to, in my opinion, three very excellent presentations. Sandra Newman identified some of the problems we have in getting adequate information for decision-makers. She shared with us some of the benefits we get from the uses and, you might say, abuses of using the sample surveys and pollings: their shortcomings and benefits in certain cases, and the impact they might have on public opinion and the decision-making process.

Then I listened to a young lady I've been looking forward to meeting for a long time — Sarah Chasis. I had heard a lot about her, and I am glad to see she does not have horns, despite everything my lawyers have been telling me — they've been locking horns with her in some of these OCS lawsuits. NOIA has been involved on one side, while she was involved on the other side. If she was representing what she called the public interest, I wonder what she thought we were representing. But I'll get around to that in a minute.

And then, of course, I was very pleased to hear my very dear friend, Jack Willis, filling in for Bill Harsch on the President's reorganization plans. I do apologize to Jack, though, for not being more active in helping to develop public response to his requests for comments on the proposed reorganization of ocean affairs in the federal government. Because of the press of time and other business, I did not respond directly and I did not urge my member companies to respond. And that may be part of the reason he didn't get a greater turnout of comments from the ocean community.

Some of you may wonder what I mean when I say "my companies." I only mean that, as a trade association executive, I work for 350 companies in the ocean community. They are those businesses and industries that have an economic interest in developing or using the ocean's resources. And that's all of them: the oil and gas resources, the minerals of the deep ocean, fishing resources — even the companies that finance operations offshore, the banks, the insurance companies, everything. To use a cliche, "We cover the waterfront."

Now, let's get back to Sarah for a minute. Sarah started out by quoting former EPA official John Quarles, who also happens to be an old friend of mine. And she quotes him as saying that the reason for these public interest groups is that business is able to take care of itself in these kinds of activities, which implies that the nonbusiness people are not.

Well, let me say that many of the smaller companies I represent really are not able to take care of themselves in this area of dealing with government. They really don't have the in-house capability to study the Federal Register and to realize what the federal government is doing to them. But they have NOIA, so they don't have to worry about being unrepresented.

The NRDC is a so-called public interest group. Sarah mentioned that phrase several times. I remember, back in college, in Public Relations 101, we talked about many publics. When you are talking about public relations, there are a bunch of publics. And NRDC is one of the most effective of the public interest groups. But which public is it supposed to represent? I don't quite understand. I have never quite figured out who the members of NRDC are. Who pays them, and so forth? When they are supposed to be representing the public, I'd like to know a little bit more about what that public is. It certainly is not the ocean industries, and we are part of the public.

When they talk about the oil and gas development on the outer continental shelf, NRDC plus the states and local communities were successful in getting their ideas across for a while, particularly in those cases related

to offshore drilling. The one case I know specifically about was the Mid-Atlantic lease sale, number 42. The State of New York, Suffolk County, Nassau County, NRDC, and others got together in 1976 and sued the Secretary of the Interior to stop the Mid-Atlantic lease sale. NOIA found itself in the very strange position of hiring lawyers to defend the Secretary of the Interior. Would you believe that?

I never thought I would come running to the defense of the Interior Secretary. But in that case I did. And the Supreme Court, in the spring of 1978, after holding up the lease sale for 19 months, and holding the companies' $1,130,000,000 without any interest, finally let the companies drill. Since the Supreme Court ruled in our favor, I think that maybe we were representing the public interest, rather than NRDC and those localities and others who were holding up offshore development.

But let's talk about what we're here to talk about. And that is public opinion as a limitation to rational decision-making. I am rather concerned about the use of public opinion and the perspectives of public opinion in decision-making. Because, after all, what is public opinion? The very word itself is elusive. One's opinion is not necessarily based on fact, not necessarily based on knowledge. It's almost like grabbing a piece of mercury on a slick glass surface — you grab it here, and it squirts out over there.

This public opinion very often is based on scare words. We all are guilty of using words to build up so-called public opinion on an issue. We heard yesterday about the "Flipper syndrome" in considering the tuna-porpoise problem. And I think that was a very reasonable and very serious observation. As an example, take the public opinion on the Panama Canal treaties. Was the influx of letters that poured into the Congress a true representation of public opinion? From one day to the next, the opinion may have varied based on the number of letters.

We can't depend on the public-opinion polls, as we heard a while ago from Sandra Newman, because they are volatile, since humans are the subjects of the polls. Look at the public opinion of President Carter, for example. When he first took office, his public opinion was quite high; now it's quite low. And it changes from day to day. Therefore, to base public policy or government decisions on public opinion, I think, is skating on very thin ice. One's opinion also depends on one's self-interest. You know, I have an opinion. I remember one time talking about it from my own self-interest. I had a fellow who used to do my yard back in McLean, because I was always too busy to do the yard. One day I was talking to him about my views on politics and important things like OCS and NRDC, and finally he said, "Mr. Matthews, you are the most unbiased and impartial man I have ever seen in my life — from your point of view." That's sort of the way that we all have to look at public opinion, from our own selfish point of view.

Now, another thing to consider when we're talking about public opinion and about the people being informed. Let's get serious for a moment when we talk about the people actually being informed. Some of us are paid, as I am, to represent a special point of view. There are others, like some of us at the table in this audience, who have a responsibility to inform the public. I think we must follow through on that responsibility to the best of our ability. Each of us needs to tell the people the facts from our point of view. This is what you might call a grass-roots operation, like lobbying in the Congress, or in the state legislature, to make statesmen out of the legislators. You know what a statesman is? A statesman is a politician held upright by equal pressures from all sides. Now, what I am is a pressure — I'll admit it. I am helping to keep the politicians upright to make statesmen out of them. And I would like all of you to participate in that effort.

Stephen Olsen

Coordinator, Resources Center, University of Rhode Island

The perspective I bring comes from several years of involvement with the Rhode Island Coastal Zone Management Program. The Coastal Resources Center here at the University has worked since 1972 with the state's Coastal Resources Management Council, which has broad authorities to plan for and to manage the coastal resources of this state. We worked together to develop a comprehensive program that became state law in 1977 and was found by the federal Office of Coastal Zone Management this May to meet the requirements of a 306 management program. The Rhode Island program has teeth, it is comprehensive, and it has broad-based public support, so it appears that we have done some things right.

Public opinion has had an enormous impact on our program. There is no doubt in my mind that crucial to our success has been the public involvement in the program as it has developed. Our public participation efforts have had a central place over a period of three years, for we became convinced early on in the process that building a constituency for coastal management was essential.

There have been two key components to our public participation efforts: they are public workshops and the press. Underlying this is the recognition that public participation in a program such as ours is meaningful only if all parties recognize that we are engaged in a process that involves learning on both sides. We, the people who developed the management strategies and drafted the program, did a lot of listening. The entire document was redrafted three times. Each time, those who had commented saw that their thoughts had indeed been considered and, not infrequently, that they had made a difference. An important vehicle that we used to solicit input was workshops. These were well-advertised informal gatherings where draft sections on specific topics were explained by their authors and then discussed. It was essential that the materials distributed were in fact drafts and that we were indeed soliciting input. It was very healthy that interest groups, from all sides, had to voice their opinions in a public forum with the press in attendance. Extreme views of what the program should or should not be, which were voiced by such groups as NRDC on the one side and the electric power company on the other, were set forth for all to hear. In this process the press, in a way, acted as a referee and did much to help find the "middle ground" where we could live together. In deference to Sarah Chasis, I must say that the NRDC comments, which at times are as lengthy as the draft program itself, were instrumental in making the final program a strong one. However, we would have failed if we had done all that they at first demanded. The power company also had excellent points. All parties were conscious of public opinion as sensed at the workshops and conscious of the press, and this did much to help us find the compromises. Again, I would underscore the importance of an open process.

A quick comment on public opinion surveys. My feeling is that they can be useful in providing a reading of how the public — often a disinterested public — reacts to a series of questions on a particular date. It is a temperature reading. The problem is that it is one reading and therefore may not be very helpful if you are engaged in a process. Furthermore, the statistically validated random sample may be largely irrelevant when trying to gauge opinion for something like a developing coastal management program. The views of NRDC and the power company do not get picked up in a public opinion survey, nor do they provide the "feel" that you get in a workshop. Of course, it is important to recognize that the public does not cast ballots on a coastal program; if they did, a reading of the disinterested public would be more important.

THE DECISION-MAKING PROCESS

Timothy M. Hennessey, *Session Chairman*
Political Science, University of Rhode Island

Ocean Management: Seeking a New Perspective

J. M. Armstrong
Director, Coastal Zone Laboratory, University of Michigan

It's a pleasure to be here again. This is one of a series of visits to Rhode Island for me and I thoroughly enjoyed being here again. I'm coming here in a little different context than in the past. We just found out about giving the paper about two weeks ago. I'm not offering that as an excuse for what follows, but we had to pick and choose from an immense amount of material that we have been developing as a result of our current ocean management study. I've tried to relate it to the decision-making process, which is the subject of this session, although some of what I'm going to say might well have been better said in the first session, in which we talked about the background of ocean management.

Before we start, I'd like to introduce Peter Ryner. Peter and I are doing our study for the Office of Policy. Peter and I also have just written a book together on what we call coastal water management or the management of the territorial sea. We've now begun to look at the broader ocean management problem with Jim Curlin, primarily, in the Department of Commerce. Jim is involved in a variety of activities at Commerce relating to a new look at the oceans.

There have been a number of studies, activities related to ocean policy, and discussion at the federal level, and in the midst of this, our charge has been to step back and try to take a quick but in-depth look at ocean management from a different angle than the current discussions are doing. We have tried to go back and look at ocean management more as a resource management problem and less as an administrative or organizational problem, which much of the current discussions have centered on.

Thus, we haven't tried to focus, in our current study, on which agency should do what, although one can't avoid that, unfortunately. Our study is not finished; we are still working on it. We've got some of our results here with us and we've been sifting through, picking the parts that we think would be of most interest and relevance to this meeting.

I think it's important, in the discussion of decision-making, to understand and talk a little bit about where we've come from in the U.S. in what we have come to call "ocean management." I think there are some real problems with that choice of discriptor. It is interesting to review how ocean decisions have been made in the past, what kind of policy structures we have inherited and evolved and, in one way or another, had to live with, although we are not stuck with them by any means. In doing so, we have to look back at least 40 years, and so much of what I'm going to say today is going to deal with history. I'll see if we can stick to 30 minutes and talk about some of the background and a little bit about some of the difficulties involved in evolving what we would call a real ocean resource management program as opposed to an administrative structuring problem. Not

that that's not an important problem.

The U.S. seems, at the present time, to be at a major decision point regarding the oceans, although this decision point has really been emerging for several years and it's more like being at a junction on a continuum of activities rather than some single, sudden need to make choices immediately. In simplified and potentially less misleading terms, the question facing the President and the Congress, the public and all the agencies involved (the 21 agencies that have ocean-related programs) is whether or not the United States needs to establish new institutional arrangements or a new management regime in order to assure that our national ocean-related interests are most effectively guaranteed. Should there be a department of the oceans? Should there be a new federal ocean management program? Should the Coastal Zone Act or program be continued or should it be expanded? Should separate regulatory management regimes for the coastal zone, the outer continental shelf, and the superjacent waters be maintained or restructured? Should the U.S. continue its current position at the Law of the Sea Conference? Should the United States support a separate living resources management regime for the Antarctic? Should we have marine sanctuaries? These and a host of other questions are impinging on this idea of ocean management, but all of them have origins in the past, so they are not something that has just come up.

If these are important questions, and I think they are, what should be the basic purpose of "ocean management" and how can it be structured so that we can accommodate rather than interfere with our multiple national ocean-related interests. This is the very difficult question that is being asked.

About a year ago, the President directed the preparation of a basic review of our present ocean-related efforts, especially within the domestic sector. This review is being completed now by Jim Curlin's office, of the Department of Commerce. Our group is about two-thirds of the way through a supporting study that I mentioned before. This will include an examination of what our ocean-related national interests are and to what degree present institutional arrangements are dealing with these national interests. We all know — those of us who follow the coastal zone management program — what difficulties there have been in grappling with the matter of what the national interest is. We don't profess to have solved that problem. I am going to talk a little bit about the importance of it with respect to ocean management as opposed to the somewhat more narrow ocean-related management activities in the coastal zone management concept.

A number of activities have gone on in this area. The State Department undertook a major review of national interests in relationship to the Law of the Sea Conference last winter, after what was felt to be a particularly unsatisfactory session on the Law of the Sea. From our own perspective on the current study, the Presidential Reorganization Project has made certain preliminary suggestions for the restructuring of some of the ocean-related and other natural resource programs. It's not official yet, and the President has indicated that there will be a Presidential review memorandum process — the PRM process — on ocean policies and programs within the next few months. At the present time, the scheduling of that process is uncertain.

Let me say something I didn't mention in the beginning. Everything we say here today is our own opinions and do not reflect anything occurring in the PRM Process or in our final study results for the Department of Commerce.

There are a number of basic decisions pending on what should be the objectives and scope and structure of a national ocean program or process. It is most difficult to fully understand and evaluate the present "ocean regime," whatever it's conceived to be, with complex divisions into geographical regimes, multiple functional programs, 11 departments, 21 agencies, several additional international programs, and numerous issues and debates.

We found it helpful to go back perhaps as much as 40 years, to the middle thirties, where many of our present programs and issues seemed to have their roots, or at least had received the first serious discussion and debate.

Indeed, some of our current ocean regulations and programs go back to the foundation of the nation and even before, to international custom and British common law, as those of us who have been looking at the legal problems have seen. There is a pattern of continuous development and evolution of ocean-related activities from the eighteenth century through the nineteenth century and into the twentieth century. Some of them are spaced far apart, and we tend to ignore them as individual events, but we think they have some common threads. For example, the River and Harbors Act of 1899 is still a viable ocean-related management tool and it has received considerable debate with respect to its ocean-related activities. But our own current ocean-management program as we might define it — and I'm not going to do that right now — seems to have begun in the middle thirties. And if a particular year must be chosen, 1937 seems to stand out as a watershed. It is of note that some 40 years ago many of the dialogues of today were to be heard, in the same words and phrases as today, and that at that time the national ocean interests were recognized to include military, international, fishery conservation, national territorial versus state dimensions, and other elements.

In the 1975 review of federal ocean programs, the General Accounting Office, which we have heard about several times here at the conference, had concluded that it was important that we have an overall coordinating mechanism for our numerous ocean-related laws, programs, policies, and agencies. They spoke of lack of coordination, of a collection of single-purpose programs that had no overall sense of direction, no mechanism for conflict resolution, and no formal communication or coordination links. Some of you here may be familiar with that report. The National Ocean Policy Study reflected many of those same opinions.

Ten years ago the Stratton Commission, which we all know about, came to much the same conclusion, although its focus was much more on marine science and marine affairs than on what we would call ocean management.

These perceptions of fragmentation, overlap, and lack of direction have led to several proposals for centralization, coordination, and recodification of ocean-related programs. GAO recommended the establishment of a national ocean policy and management program. Senator Hollins has proposed a Department of the Oceans, as have others. In late 1977 there was a growing feeling by some groups that something should be done — I wouldn't call it a consensus. The focus of that concern was primarily on a variety of institutional structures to achieve the sense of coordination and direction that was felt to be lacking.

However, there was also a growing appreciation on the part of some that it was important, in evaluating institutional arrangements, to have a clear sense of what we were trying to do and why, rather than just to go out and reorganize again. For example, what does or could ocean management mean? That's been the topic, the generic topic, of the work that we have been involved in; we hope that we are going to come up with some insights.*

Let me turn now more specifically to that history I've mentioned several times, and briefly examine what happened in the past and what things we've learned, if any.

In 1937, the then Secretary of the Interior, Harold Ickes, had recognized that the oceans represented a set of resources of great national significance. He further determined that since the establishment of our nation, no one had ever legislatively spelled out the distribution of federal and state authority in the oceans. He felt that if the states continued to be the owners and regulators of the territorial

*This work was completed in September 1978.

sea, as they traditionally had been held to be up until the 1930s by both federal and state government, many national opportunities might be lost, including, of course, the collection of significant revenues from offshore hydrocarbons. In that year, he initiated a campaign to assert federal domain over the territorial sea, in place of state control, and to extend the territorial sea of the United States seaward to a distance of 100 to 150 miles, in which the United States would claim ownership and control over the submerged lands, the superjacent waters, and the resources therein.

Prior to 1937, the Department of Interior had rejected applications for offshore leases under federal land-grant legislation, on the basis that the federal government had no jurisdiction either within or beyond the territorial sea. But in 1937 Ickes initiated a new policy of not turning down such requests, but rather holding them in obeyance until the jurisdiction and ownership could be clarified. This had a chilling effect on the discussions and prospects for offshore drilling and also on port development and other ocean-coastal activities as well, clouding title to all types of facilities in that category. At the same time, Ickes convinced Senator Nye, of North Dakota, to introduce legislation that would declare full title and control over the territorial sea for the federal rather than the state government. This action was to lead in time to the introduction of perhaps 100 pieces of legislation, more than 15 congressional hearings, a series of Presidential vetoes, a proclamation of President Truman, an important issue in the 1952 Presidential campaign, charges of bribery, the resignation of Ickes, three major Supreme Court hearings declaring that the U.S. did not hold title and the states did not hold title but the federal government had "paramount rights" in the territorial sea and subsequently to the passage, after Eisenhower's election, of the Submerged Lands Act and the OCS Lands Act of 1953.

While all these domestic events were occurring, President Roosevelt and the Department of State had become increasingly concerned about foreign fishing in U.S. waters, especially extensive salmon fishing by Japan in the Bristol Bay of Alaska. Along with strong diplomatic protests, President Roosevelt gave serious consideration to the extension of the U.S. territorial sea out to a distance of 150 to 200 miles in the Pacific and the creation of what I would call a "marine sanctuary" (which they called a "game preserve") in which salmon fishing would be prohibited, except under U.S. permit. This was in 1937 and 1938 — 40 years ago!

The Second World War disrupted these considerations, but in 1943 they started again. In May of 1943, the Department of State set up a committee to study the question of U.S. ocean interests beyond the territorial sea. In June, Ickes wrote a letter to Roosevelt suggesting the need for a new United States ocean management regime extending perhaps 150 miles out to sea, to include both the submerged lands and the superjacent waters, and suggested that policy should be developed so that they could be used in war-settlement negotiations. Roosevelt embraced the idea and he put a study in motion.

This course of events seemed to bring the U.S. to the beginnings of a debate of sorts between the State Department and the Department of the Interior. What Ickes wanted was a comprehensive management regime, presumably to be administered by Interior. The State Department increasingly seemed to argue for the establishment of three separate regimes: the territorial sea, the continental shelf itself, and the superjacent waters as distinct entities. The authority over each would be different. And, as is true today, the primary concern was that the United States might unilaterally extend controls over the high seas, which would cause retaliatory actions by other nations that could hamper our distant water fisheries. The Navy joined in this debate (although its interests were not as well formed and articulated as they are today) with a general feeling that a major expansion of our territorial sea might be counter to na-

tional security interests overseas. The debate was settled in part by allowing State to work up a policy on fisheries and Interior to work up one on the continental shelf. In that decision was a basic acceptance of approaching ocean waters on a fragmented, single-purpose, functional basis, while approaching the continental shelf on a systems, or comprehensive geographical basis.

After a series of maneuvers and debates, Truman issued two proclamations in 1945, shortly after the death of President Roosevelt. In those proclamations the State Department won and Interior lost in terms of the unified versus diverse ocean regime questions. The U.S. claimed full authority over the continental shelf out to a depth of 600 feet over the continental shelf, and asserted the right to establish fishery conservation zones in the high seas. In fact, it is striking how similar the Truman Proclamation on Fisheries is to the present Fishery Conservation and Management Act passed 31 years later.

As a result of these historical dynamics, we have inherited a complex web of ocean programs, agencies, and regimes. The states were given authority over the submerged lands and the resources of the territorial sea, but not over the waters of the territorial sea, where authority was and remains ambiguous, functional, and complex. Beyond the territorial sea, federal government had jurisdiction over the continental shelf, which subsequently was extended by international convention to an unspecified distance, determined mainly by our ability to exploit its resources. The waters beyond the territorial seas were high seas and never referred to as ocean waters or in any way that would suggest a manageable unit. Indeed, the focus was primarily on navigation or fishing. This system was really solidified by the 1958 Geneva Convention, in which the territorial sea of three miles, a contiguous zone of nine miles, and the continental shelf and highs seas were recognized as distinct units.

What strikes us here is the degree to which this history does not seem to be reflected in present discussion of ocean management. One must ask how there can be *coordination, "comprehensive policies"* or unified administration, when as a matter of national policy, at least in the past, we seem to have viewed such approaches with some concern. In the past, we have responded primarily to the concerns or interests of foreign policy and defense and therefore it's not surprising that NOPS, the Stratton Commission, GAO, and all the others have found a lack of coherency, multiple regimes, and what might appear to be single-purpose approaches to ocean management.

By the middle seventies, if not ten years earlier, it became apparent, as it is becoming increasingly so today, that the oceans have a new and greater importance to the United States and to other nations of the world than they had in the forties, the fifties, or even the late sixties. And, because of this, these past arguments and strategies and regimes must be closely reexamined. Several factors need to be reexamined very closely: the diverse collection of single-purpose or single-focus programs; the management isolation of submerged lands from the waters above them; the distinction between territorial sea and the waters beyond; and the linkages between oceans and the atmosphere and mainland activities. All of these factors need to be examined much more closely than they have in the past, particularly if we are going to talk about reorganization and restructuring.

As the United States participates in the formation of a new world ocean management regime, it becomes apparent that we have no clear and unified domestic perspective of our total national interests in the oceans and little understanding of how these relate to other national nonocean interests. However, there is a new awareness of ocean resource management emerging. We are currently involved in living resources management and control relating to food production and in management of a host of other activities in the oceans. Things seem to be happening at a very accelerated pace, and there are serious and

major problems. There are also some major opportunities to be seized upon. It seems clear that our present ocean-related programs and policies, as currently structured, cannot guarantee that we are or will be in a position to deal with these problems or respond to these opportunities.

The Marine Resources and Engineering Development Act of 1966 represents one attempt to develop a comprehensive long-range view of the ocean, but as the reviewing bodies — GAO and the Senate — have indicated, the act has never been fully implemented or completely successful in achieving the goal. The Stratton Commission also talked of an integrated approach, but that was still a time of marine science and marine engineering rather than "ocean management." There was also no strong consideration of how ocean management would link with other federal programs not directly related to the oceans.

One of the primary reasons we may need "ocean management" may be our present lack of ability to deal effectively with the multitude of trade-offs which have increased dramatically in number and complexity in recent years. Without a unified concept of ocean management — and I'm speaking of substantive concepts rather than programs or agencies — individual states and individual federal departments or agencies may make them without the benefit of any directed articulation of what those national interests are, in spite of all the studies we have.

Without a comprehensive national concept of ocean management, trade-offs made by other nations or by the international ocean community may impose unnecessary or disadvantageous costs upon our national interests. Without such a concept of ocean management, each functional program may be inclined to make trade-offs which optimize its values and impose undesirable costs on other activities in the oceans. I also feel that without a comprehensive concept of domestic ocean management, the programs of foreign affairs and national security interests may have to make trade-offs in the interest of national security, which will not fully account for the interests and options of other domestic ocean needs. There needs to be a balancing mechanism which does not now seem to exist.

All is not lost, of course. We do have many activities that have to do with "managing" ocean resources, activities underway or just being implemented. At the present time we have navigation programs, fisheries programs, pollution programs. We have all sorts of things happening, but we probably do not have "ocean management" in the sense that at least some people perceive the concept.

One example of the difference between what, I think, people would agree is a broad concept of ocean management and present efforts is the Marine Sanctuaries Program. These sanctuaries, preserves of habitats, historic sites, and special environmental areas are examples of a larger management concept: what I would call *special areas management.* Here we could conceive of the identification of key ocean sites and characteristics such as breeding areas, navigational fairways, weapon-testing sites, areas of ocean energy concentration, and so on. The Marine Sanctuaries Program addresses only a limited subset of special areas that need to be managed. In the Marine Sanctuaries Program, we are using a tool without a conceptual framework in which the full range of ocean resource attributes and uses have been examined, structured, and given priorities. If we wish to talk about ocean management as a systematic, comprehensive effort to identify, maintain, and enhance the full range of ocean-related interests, then before we establish marine sanctuaries we should undertake a substantive review and identification of national ocean-related interests, needs, opportunities, and problems for each ocean region or resource system. Then a multitude of tools can be applied, including sanctuary programs to regulate access to ocean space and ocean resources in order to protect certain *values* supportive of our national interests. Since that has not been done on a comprehensive basis, marine sanctuary

designations are likely to cause problems, exclude or influence a variety of national ocean interests, and focus only on one aspect of concern rather than promote a balanced resource management approach to ocean resources.

Without a comprehensive concept of ocean management, we cannot be sure what trade-offs we are making in a marine sanctuary proposal. While there is a need for marine sanctuaries, there are other values that need protecting, and it is premature to apply tools without a management structure in which to place them or a framework in which to evaluate them, and we have neither at the present time.

There is another concept that is in theory attempting to manage ocean resources, at least in a narrow sense. This is the coastal zone management approach. It's the first approach at the federal level to try to group together a number of national marine-related interests within a defined, natural system and to view these interests in a comprehensive manner. I think that much more needs to be done in this area, in terms of a very detailed evaluation from an ocean management perspective. It would be opportune to carry out a thoughtful review of the coastal zone management experience from this viewpoint. I am fully aware of all of the evaluations that are going on now, but I think there are a number of program elements from which lessons might be learned, good or bad, with respect to our interests in a larger, comprehensive concept of ocean management. The very fact that the coastal zone management program has attempted to define and incorporate national interests in dealing with regional and state resources in the ocean, albeit a narrow strip of the ocean, is very important and worthy of much closer study.

The "networking" techniques of the coastal zone management effort — the objective of trying to bring together existing management agencies into a network of action — even while it's at the state level, could present some lessons for trying to do this in a federal ocean management effort. The impact and inventory approach to resource management that has been attempted by some of the coastal programs needs to be related more closely to our ocean management interests. Information needs and the development of information in the coastal zone management program and, lastly, the conflict resolution and consistency mechanisms as management elements need to receive further attention with respect to national ocean management.

I would like to conclude quickly if I can. One conclusion is that recent recommendations for ocean management efforts have consistently underplayed the complexities of present ocean-related policies, programs, and institutional structures. They have tended to define ocean management too generally and at the same time too narrowly. For example, they have given little indication of how ocean management would interface with other national concerns, such as energy management and the national water policy.

There appear to be two principle dangers from such incomplete proposals. First, there would seem to be the real possibility that a newly formed ocean management program, if too narrowly drawn, might cause more mischief than improvement. If important elements are left out, the ocean management effort might be consigned to weak performances. On the other hand; if we too hastily establish a new ocean management program, it might clash with other national policy objectives, from food supply and energy to foreign policy and national defense.

Second, and equally important, the great complexity of present ocean-related policies, programs, and agencies represents a series of *options*. Depending on which issues or activities one wishes to include within the concept of ocean management, and depending further upon which management functions or authorities one wishes to place within an ocean management program, there are a variety of opportunities for executive branch and/or legislative program design. If the various resource

management options are not fully identified, if different linkages between programs, policies, and agencies are not clear, then the opportunity will be lost.

Furthermore, it seems that most of the recent ocean management proposals place great emphasis on institutional or administrative reorganization without giving full consideration to how the present existing network of programs, agencies, and capabilities might be improved, using strategies somewhat less dramatic than new governmental reorganization actions. This is not to suggest that reorganization is clearly inappropriate, but there does exist a greater number of programs, coordinating mechanisms, and capability than is generally recognized.

Let me close with this last comment. Assertions that our federal ocean programs need to be restructured and expanded tend to be regarded with an understandable degree of skepticism, as being no more than self-serving justifications for particular institutional structures or program initiatives. It would be a mistake to allow this necessary and healthy skepticism to blind us to some of the real opportunities and needs. The Third United Nations Conference on the Law of the Sea is necessary because traditional international law and prior international agreements will be inaccurate for the conflicts in future management needs of the real oceans. Just as systems designed in Geneva in 1958 are no longer applicable to the international ocean management problem, so are ocean programs and structures initiated by the United States in the forties and fifties no longer sufficient. The Law of the Sea negotiations themselves will have represented, and already represent, one of the prime reasons why the United States must both expand and restructure its national "domestic" ocean programs in order to interface more advantageously with new emerging international oceans regimes. We cannot separate domestic ocean management from international activities. In all of the reorganization activities that have been drawn up, I fail to see an adequate consideration of that.

Pinpointing and documenting the needs for new ocean management initiatives is a difficult task. It is important that broad assertions of need be challenged, but that does not mean that the need does not exist or that the national interest can be served by failing to respond to that need.

The Decision-Making Process and the Formation of Marine Policies

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To anyone familiar with the history and particular character of marine policy in the United States,[1] it would be hard to deny or quibble with the stunning, summary denunciation by the Comptroller General: in 1975, the United States "had no comprehensive national ocean program."[2] Rather, what has been consistently the case is a highly fragmented and politicized decision process that appears to be incapable of measuring up to the large and expanding set of problems that press for attention and resolution.

In the following brief sketch — so brief as to be more caricature than portrait — elements of a general decision-making process are presented and then set off against what appear to be the main institutional and realistic features of marine policy-making and execution.

Decision-Making as a Process

It is helpful to conceive of problems as having a "life," during which time they emerge, are defined and estimated as to their potentialities, are confronted with strategic statements (policies) and tactical measures (programs) that are expected to reduce or resolve their unwanted consequences, and in time end, stabilize, or worsen as a result of both corrective acts and changes in the problem setting itself.[3]

Invention or initiation, the earliest phase of the process, begins when a problem is first sensed. At this point, a number of ways to alleviate it may be proposed, including many ill-defined and inappropriate solutions. This phase, marked by a casting about for raw information and even more unrefined answers, should help to sharpen and redefine the problem.

Estimation, the second logical step in the process, deals with risks, costs, and benefits associated with each candidate solution suggested in the invention phase. Estimation implies narrowing the range of plausible solutions (by excluding the infeasible or the truly exploitative, for instance) and ordering the remaining options according to scientific *and* evaluative criteria. A battery of sophisticated methodologies, in varying states of development and of varying degrees of suitability or appropriateness, exists for these tasks.

The third, or *selection*, phase is most easily seen as the "political" step. Someone, usually the policy- or decision-maker, must select from the "invented" and "estimated" options. This individual (or collectivity) must strike a balance between the analyst's rational calculations and the multiple, changing, and conflicting goals of those having a stake in the problem and the society at large.[4]

Implementation refers to the execution of the selected option. As evidenced by heightened interest in and statements about the failures of policy implementation, this is a phase of the overall policy of decision process

that is little understood, not particularly appreciated, and not well developed. As with the other phases of the overall process, we need to think more systematically about implementation and to integrate it into the other phases.[5] Certainly one must understand implementation mechanisms before government (and other) performance can be evaluated and improved, the next step in the sequence.

Initiation or invention and estimation are primarily forward-looking activities. Selection stresses the urgency of the present. *Evaluation* is basically backward-looking, is concerned with inquiries into system performance and individual responsibility, and is restricted to figuring out how well problems are being dealt with and resolved. Typical topics and questions reflected in the idea of evaluation include the following: What officials and what policies and programs were successful or unsuccessful in resolving a given problem? How can one assess and measure performance? What criteria were used to make those determinations? Who made the assessment, and what were the assessor's purposes? Evaluation is a necessary input to the next and final phase of the process.

Termination is necessary when policies and programs have become dysfunctional, redundant, outmoded, unnecessary, and so forth. From the conceptual point of view, it is not a well-developed phase; however, one should not rate its importance by our lack of understanding of it, as has been startlingly illustrated by recent taxpayer initiatives and by a growing concern in the federal legislature for "sunset laws" and "zero-based budgets."[6] How, for instance, can a policy or program be adjusted or terminated without having had a thorough evaluation? Who suffers from the termination? What provisions for redress have to be considered? What personal costs are involved in termination? Can they be met? What can be learned from termination that will inform the initiation and invention of new policies and programs in the same or related fields? The list of relevant questions is long, but neither these questions nor the fact that termination is linked intimately to other steps in the policy process should be ignored.[7]

The value of a conception of a decision-making process is manifold,and several of the possible benefits of this concept are portrayed in Figure 1.

Figure 1. Benefits of the Policy Process

Phase	*Possible Benefits*
Initiation/ Invention	• Recognition of a problem • Creative thinking about a problem • Prototypical design • Crude hypothesis testing • Preliminary investigation of concepts
Estimation	• Scientific examination of likely impacts and outcomes of plausible options • Normative/evaluative examinations • Development of outlines of a complex policy including program details • Appraisal of claims of key participants • Development of performance indicators • Specification and estimation of key parameters
Selection	• Focusing of debate on actual issues • Allowance for political compromises • Realistic choice among program designs and options • Reduction of uncertainities about options
Implementation	• Development of rules, regulations, and guidelines for execution • Development of specific pieces of a program • Establishment of performance standards, based on previous estimates • Minimization of execution costs
Evaluation	• Comparison of estimated and expected performance levels with those attained • Assignment of responsibility and sanctions
Termination	• Determination of whether problem is chronic, recurring, or resolvable • Generation of information about new problems created in termination acts, some of which may require planning, political attention, and treatment

Marine Policy and the Process

With respect to this idea of life cycles of the decision or policy process, several crude and summary observations about marine and ocean policy are worth making.

With the exception of the selection phase, there are few, if any, identifiable institutions or individuals who are primarily concerned with the other five phases of the process.

Problems have been identified from the earliest days of the Republic, usually by individuals who have studied and become concerned about the aimlessness and potential consequences of the ad hoc policies and programs found at various times in our history; however, these cries of alarm have been neither numerous nor have they been acted on with a fraction of the energy and resources needed to "make a difference." Initiation and invention, in short, have been sporadic and unconnected from the sources of power and wealth which could and should have been galvanized to make creative and useful decisions. Estimation has been grossly undercapitalized and neglected. It is remarkable that centers for the study of ocean management problems have only been created within this decade; scholarship and analyses are likewise in scarce supply. Implementation has been left to a bewildering array of offices and agencies, and the results have been far from satisfactory — a point made in the stinging indictments handed down from time to time by the General Accounting Office, a primary source of evaluation in this area. Aside from the GAO, however, there are few examples of systematic, comprehensive, and scholarly evaluations; this phase of the process is at best embryonic. Termination, with one notable exception of the coastal zone program in California in recent years, has not even been considered, much less institutionalized in a responsible way.

This is not to say that the federal government should be held accountable for these glaring deficiencies. Nor is it to say that future efforts should stress a concentration of attention and effort at the federal level. Rather, a full flowering of ocean management initiatives, in a variety of governmental and other institutional settings, is long overdue. Lacking such developments, the current system is one that suffers from and overemphasis on political choices taken without benefit of considerations of ocean problems from a variety of perspectives (other than those of special interests who appear to have dominated the process so far). It is a system that fails to learn, from its own mistakes or from mistakes made in closely related fields — e.g., environmental, national security, and others. And it is a system that is headed for monumental difficulties if many concerned scholars, analysts, and officials do not begin to face these facts in a responsible way.

Any one of the individual phases of the decision-making process could be singled out for more detailed attention, especially as concerns the information, resources, demands, and institutions that are operating or that could be devised to improve prevalent practice. However, the remainder of this discussion concentrates on those phases of the process that appear to be most critical with respect to marine policy.

While one may dispute details of the following assessment, its basic message is much harder to discount.

> Despite all the efforts of the American people, the Congress, and the President to focus on a national ocean program, despite the several acts and administrative reorganizations within the federal government, and despite the extraordinary resources channeled to scientific research, surveys, vessel construction, subsidies, and other forms of aid to the marine community . . . it was doubtful whether the resources of the eleven departments and agencies closely involved with marine affairs "are being applied to best serve national purpose." What troubled many observers of the development of American policy for the oceans was the fragmentation of the decision-making process into several agencies, often competing or overlapping in their functions. Washington, beset not only by the organized interests of the shipping industry, fishermen, energy producers, environmentalists, and others, but also traumatized by the politics of its bureaucracies, seemed inept in setting priorities and incapable of implementing a strong, purposeful ocean policy to embrace both domestic and international needs.[8]

From this assessment, two weaknesses of the existing decision-making process tend to stand out and require comment and attention: initiation or invention and implementation.

Initiation

To an outsider, such as myself, much of the decision-making activity of the last decade in marine affairs appears to have been con-

ducted without benefit of suitable or adequate information and intelligence about the nature of problems confronting the nation. For example, the Fishery Conservation and Management Act (P.L. 94-265) mandated revolutionary changes in policies and programs, but did so mainly in response to strident appeals from particular interests and without much regard to basic facts of life about the context or setting in which these changes were to take place.[9] Desires to protect U.S. fishermen notwithstanding, one is hard-pressed to find anywhere in the act what is meant by such basic terms as "maximum sustainable yield," "optimal sustainable yield," "harvesting capacity," or a host of other fundamental terms and provisions. Abdicating responsibility for these determinations to regional councils not only guarantees uneven and contradictory resolution of the matter, but it also stresses the mindlessness of those responsible for the formulation of the act (and its attendent policies and programs). It is in effect decision-making without specification; policy-making without information.

Contextual specification requires one to concentrate on several key elements: the identification of criteria to define the problem; the specification of relevant environmental parameters; and the identification of the time frame and other constraints that help to bound the problem.

The identification of proper criteria is fundamental to the policy and planning tasks. Without an ability to ask appropriate questions, one can only hope to obtain, or even recognize, the right answers. As Ed Quade has nicely put the matter, "An analysis must begin with problem formulation. A major pitfall is the failure to allocate the total time intelligently, so that a sufficient share of it will be spent in deciding what he problem really is."[10] A common error in identifying criteria is to define the problem based on inadequate information, or solely upon existing conditions in the problem setting. Another danger would be to base one's criteria on symptoms rather than the underlying or root causes of the problem. All of these difficulties appear to exist with respect to the Fishery Conservation and Management Act.

The fisheries problem, oversimply, is not one of providing protection, but rather one of changing the composition and fabric of fishery practice and management in fundamental ways. If one agrees with the General Accounting Office that American coastal fishing is undercapitalized, inefficient, uneconomical, and resistant to technological innovation,[11] among other ills, then this act not only does not answer these problems, it contributes and encourages them to continue and proliferate. The problem and the decision reached to solve it are both misspecified.

A responsible analysis of the problem would proceed, after having identified the key criteria, to delineate the relevant actors, what their interactions are and can be expected to be, and how the problem can be bounded and analyzed.

The identification and assessment of actors and clients, both those who stand to benefit and those who inevitably lose, is an overtly political activity that continues throughout the entire decision process. However, the analyst has a responsibility to understand who is affected by a particular problem and the alternatives that might be generated in its solution; lacking such information, no one can judge the importance or priority of the problem.

Bounding the problem, the final part of problem definition, requires that the analyst reduce the problem to manageable proportions; the analyst has only limited time and information, and choices must be made. In a very few cases, the whole problem may be dealt with directly; more often, the problem must be decomposed into a number of smaller and more manageable subproblems. What appears to have happened in the fish conservation case is that only one small piece of the problem has been treated directly within the policy and programs created in the subject act. Protection concerns have dominated the time, attention, and deliberations of those responsi-

ble, to the point where suboptimization has occurred and basic scientific matters, such as determining various types of yield, the size and disposition of fish stocks, the current and desirable means of investing in and operating in the coastal fisheries, have all been slighted. So, too, have the enormous problems of trying to implement the act.

Implementation

Implementation does not "just happen" in the aftermath of reaching political or other decisions. It is generally a lengthy, interactive process in which the intitial "solutions" embedded within the decision are tried out, tested, and changed in response to the realities of the environment. One suspects that far too little is known about how marine policies and programs have in the past been implemented, and, as a result, insufficient attention has been paid by decision-makers to the feasibility of the options they consider and select. A choice that may be "politically optimal," in the sense that a consensus can be built and sustained, may not necessarily be optimal, much less feasible, from the point of view of those charged with its execution. An infeasible option is no option at all.

Several general questions help to make this point: How have past decisions related to the marine setting been implemented? What have been typical responses by those whose lives and livelihoods are changed as a result of these decisions? What kinds of data and information have been collected and are needed to make these determinations? Are they worth collecting; have they been collected; have they improved subsequent decisions and modifications to existing and prevalent ones? Not much is known about any of this; and most of these questions, it would seem, have been too long unasked and unanswered.

Implementation as a phase in the decision process needs to be understood better than it is to begin the necessary intellectual and practical tasks of improving marine, and other, policies.

For instance, who is responsible for the decision — what is the source of the policy? It might be a presidential directive (various reorganization plans affecting marine affairs), the passage of legislation (Outer Continental Shelf Lands Act of 1953), simple administrative decisions (allocation of the U.S. Coast Guard's annual budget to various activities), or actions of one of several types of court or international bodies (Law of the Sea Conferences). The point is that each source has different roles and functions that often determine how a policy is defined, selected, and implemented. In the case of the Merchant Marine Act of 1970 (P.L. 91-469), the fact that federal legislation is the most obvious source of the policy is essential, but it is not the only fact that one must consider. For instance, was the law passed in the wake of extensive debate and consideration of the various provisions — careful reading of the legislation indicates that this did not occur[12] — or were a relative handful of powerful special interests able to tailor the decision to their own needs? Did it have narrow or overwhelming support? If narrow, did this mean that the wording of the legislation was left intentionally vague in the interests of concensus building and eventual passage? How are the actions of other policy sources — e.g., local courts, boards, commissions — likely to reshape the policy through time? In the case cited, it appears as though effective implementation was rendered nearly impossible, and a careful assessment of the source, including the incentives and motivations of the key participants, could have led one to this conclusion without undue difficulty very early in the game.[13]

The complexity of the administrative process is another general implementation concern that demands consideration. This refers to the number and interrelationships of different agencies that must be coordinated — both horizontally and vertically — in order for a decision to be implemented. Obviously, the greater the number of institutions that have to be considered, the more difficult and complex

the process of implementation.[14] In general, furthermore, the further removed the decision-maker from the implementing agent and the client, the greater the opportunity for distortions or variations of the policy from its original intent. The Commercial Fisheries and Research Development Act of 1964 as amended illustrates some of what is at issue here. In the words of Mangone:

> The overblown expectations of invigorating the American Fishery industry while assisting the developing nations of the world were thwarted by the initial high costs of manufacture, wrangling within the industry and government, bureaucratic inertia, and weak responses in the undernourished countries. Least helpful was the conservative attitude of the U.S. Food and Drug Administration, which first regarded the crushed fishmeat and bones as "filthy" and then as possibly dangerous with their residues of lead and flouride.[15]

This calls attention to the essential question of how involved the high-level decision-maker should become in order to ensure that the project is implemented as intended. Out of necessity, one would not expect such individuals to become involved in the day-to-day details of implementation; a more parsimonious strategy for these individuals is to stress evaluation, careful specification of intent, and a thorough consideration of the motivation and incentives of those called on to carry through the details of the program. In this case, such an appreciation and style were absent, leading to the conclusion that "whether the total investment of public revenues into fisheries had justified the return to the economy of the nation was debatable."[16]

Although this short discussion of only a few of the factors that influence implementation hopefully points the way to some of the missing ideas and analyses in the marine policy arena, the discussion is far from complete. Implementation is nontrivial, and an appreciation of the enormity of the proper implementation task would help one understand why analysts and practitioners have been loathe to address the topic with enthusiasm. (In a remarkable exception to this general finding, Lawrence Schaefer, a graduate student in Yale's School of Forestry and Environmental Sciences, has attempted to examine the differential implementation of the wetlands conservation legislation in the state of Connecticut, Not only did he not have precedent studies to rely on in structuring his explorations, but the primary information needed to describe the past and current condition of Connecticut's estuaries did not exist anywhere and had to be created.) Decision-makers are equally reluctant to address the substantive issues of implementation, and merely issuing a new set of rules and regulations in the face of past failures (as quite likely would have been the case in Connecticut in the absence of studies such as Schaefer's) only neglects the central problems of implementation: rules are subject to a variety of interpretations by individuals throughout the system, and plans generally fail to account for the unanticipated as well as organizational and/or personal obstacles that can and almost certainly will arise.

Where To from Here?

It is somewhat reassuring to realize that many of the problems inherent in a full appreciation and understanding of the policy and decision processes reasonably for marine policy are beginning to surface and to demand attention and clarification. The creation of centers devoted to the study of marine policy, beginning, I believe, with the University of Delaware in 1973, is one hopeful sign that a more comprehensive and comprehensible marine policy may in time be forthcoming. One must stress not only the incredible tasks of institution-building, conceptualization, and analysis that face the nation and those for whom oceans and waterways have interest and appeal, but also the enormity of the stakes that are at issue. As compared with the resources that have been expended for technical analyses of marine research questions, the sum so far expended on marine policy formulation and analysis is paltry indeed (this judgment is made on an impressionistic basis,

given that no proper accounting of both general classes of expenditure has yet been made). As compared with the stakes, the little time, diffuse attention, and scant resources that one can identify as being devoted to marine policy are nothing short of criminal. The time is long overdue when all best efforts should have been bent toward the formulation and implementation of a comprehensive national ocean program — efforts that may begin only after the full complexity of the decision-making process is appreciated.

Notes

1. I have relied on a well-known, if somewhat unconventional, source for my preliminary musings on this general topic: M. S. McDougal and W. T. Burke, *The Public Order of the Oceans* (New Haven: Yale University Press, 1962).
2. U.S. General Accounting Office, *The Need for a National Ocean Program and Plan* (Washington, D.C.: Government Printing Office, Report B-145099, October 1975). This seems to be an honest effort to appraise the past, present, and unlikely future of marine policy in America.
3. This "life-cycle" concept was described in Garry D. Brewer, "The Policy Sciences Emerge: To Nurture and Structure a Discipline," *Policy Sciences*, vol. 5, no. 3 (September 1974), pp. 239-244, where it is illustrated with problems from several distinct problem and policy arenas.
4. The discipline of political science has concerned itself with selection; indeed, much of what political scientists do is in one way or another related to clarifying, measuring, and understanding this phase of the process. One durable and comprehensible summary statement can be found in Robert A. Dahl and C. E. Lindblom, *Politics, Economics, and Welfare* (New York: Harper, 1953), especially pp. 75-90.
5. Erwin C. Hargrove, *The Missing Link: The Study of the Implementation of Social Policy* (Washington,D.C.: The Urban Institute, July 1975), is representative of freshening interest in this phase of the process and illustrates many of the key concerns and questions well.
6. Of course this refers to California's infamous "Proposition 13," whose full ramifications and implications are only, after the fact, being worked out by state authorities. For additional comments, see Garry D. Brewer, "Termination: Hard Questions, Harder Choices," *Public Administration Review* (Fall 1978).
7. The entire issue of *Policy Sciences*, vol. 7, no. 2 (June 1976) is devoted to termination topics and practices.
8. Gerard J. Mangone, *Marine Policy for America* (Lexington, Mass.: D. C. Heath, 1977), pp. 39-40. (Internal cite refers to U.S. GAO, *The Need for a National Ocean Program and Plan*, a rare effort and example of evaluation.)
9. Again, an evaluation-based study seems to have captured many of the key and still unresolved problems and dilemmas: U.S. General Accounting Office, *The U.S. Fishing Industry: Present Condition and Future Condition of Marine Fisheries* (Washington, D.C.: Government Printing Office, December 1976).
10. Edward S. Quade, "Pitfalls and Limitations," in Quade and W. I. Boucher, eds., *Systems Analysis and Policy Planning* (New York: American Elsevier, 1968), p. 75.
11. U.S. GAO, *The U.S. Fishing Industry*.
12. U.S. House of Representatives, Committee on Merchant Marine and Fisheries, *Hearings*, "President's Maritime Program" (Washington, D.C.: Government Printing Office, no. 91-17, 1970).
13. Charles L. Schultze, "The Role of Incentives, Penalties and Rewards in Attaining Effective Policy," in Julius Margolis and Robert Haveman, eds., *Public Expenditures and Policy Analysis* (Chicago: Markham, 1970). The idea of implementation as a "game" is stressed well in Eugene Bardach, *The Implementation Game* (Cambridge, Mass.: The M.I.T. Press, 1977).
14. Todd La Porte, ed., *Organized Social Complexity: Challenger to Politics and Policy* (Princeton: Princeton University Press, 1976), is replete with cases and ideas on these and closely related issues and problems.
15. Mangone, *Marine Policy for America*, p. 137.
16. *Ibid.*

Research Utilization Problems in Forecasting the UN Law of the Sea Conference; Or, The Perils of the Persian Messenger

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The bearer of evil tidings,
When he was halfway there,
Remembered that evil tidings
Were a dangerous thing to bear.

Robert Frost

At times during the period of 1972 to 1975, I bore evil tidings to the members of the United States National Security Council Task Force on the Law of the Sea. During those years I directed a research project whose purpose was to "forecast" the probable outcomes of decisions in the United Nations Law of the Sea Conference. I reported to the NSC Task Force through the Department of Defense and Joint Chiefs of Staff representatives and, for some of that period, through the State Department representatives. I did not learn only from Robert Frost — when I was halfway there — that forecasting, especially accurate forecasting, is not always welcomed by those whose future is tied up in the tidings. Since the time of Belshazzar's threats to the bearer of evil tidings, there has been a lamentable tendency of the receiver of the news to "kill" the purveyor of the news. Thus, I was reasonably well prepared for what I knew would be a difficult task. Nevertheless, I found it hard to accept the "irrationality" of ignoring the messages and destroying or undermining the system of creating warnings of probable future events. Indeed, the messages were often ignored and eventually the information system was undermined. I can only conclude that the project I directed was a scientific success and an applied failure.

Perhaps my experiences weren't unique; in fact, their appearance in mythology, literature, and poetry leads me to believe they are universal. Since the experiences I underwent are persistent ones, since they involved limitations deliberately placed upon the use of a tool of "rational decision-making," and since they concerned marine policy, I thought there would be heuristic value in reporting them as a contribution to the discussion of the limits to rational decision-making concerning marine policy. While my experience is common, detailed examinations of research utilization problems of quantitatively based research projects directly involved in the decision process are not common. Perhaps some important lessons can be learned so that it might be possible in the future to reduce the amount of "muddle" in the making of (ocean) policy. We were experienced researchers and we were able to anticipate some problems successfully. It should not be necessary for future analysts to rediscover our successful adaptations. On other problems that we anticipated, we were only partially successful in adapting our research and reporting methods, and in some cases we were not able to make any useful adjustments at all. Perhaps future researchers can do better in some areas. Perhaps in some cases where we uncovered problems that we could not solve, we experienced classes of

problems that were truly beyond rational solution.[1]

This will not be merely a historical narrative. Instead, I will briefly discuss the nature and purpose of the Law of the Sea Forecasting Project, and provide a short history of the project as background. I will present the research utilization problems we encountered, organized within a framework developed principally by Professor Francis Hoole (and, to a lesser extent, myself) and developed in depth in the paper he is presenting at this conference.[2] I shall attempt to show which type of problem had what degree of impact upon our project, and I will analyze the most important specific examples of research utilization problems drawn from each category.

Before I begin, I should publicly acknowledge my bias. *Caveat lector.* Obviously, I should not be a judge in my own case, but I offer the standard excuse that no one knows the "facts" as well as I. Equally obvious is the opportunity writing this paper offers me for catharsis. Some of my experiences of 1972-1975 were painful, and writing about them may exorcise some ghosts. But I hope this does not get out of hand. In order to keep my "cool" and avoid embarrassing specific people, I will not use the names of the individuals with whom I interacted. I present this paper not to recall old controversies but in the hope that useful lessons may emerge.

The methods of the Law of the Sea Forecasting Project were, for the most part, custom-developed to fit the nature of the large-scale negotiating environment of UN conferences. While many elements were borrowed from the literatures of UN politics, bargaining, voting, coalition behavior, and statistical forecasting, the project was not an adaption of an earlier analytic framework.

When we began, we knew that United Nations conferences were a particular brand of large-scale, multilateral negotiations, often labeled "parliamentary diplomacy." It was necessary to capture a number of attributes to model successfully the Third UN Law of the Sea Conference (UNCLOS III). They include, first, a large agenda. UNCLOS III began with a "list of issues" of approximately 100 major items. They are presently being put into texts of some 300 articles. Second, there are a large number of players who are legally equal. They all have a right to participate in the formal decisions of the conference, including voting if the formal decision rules are involved. There are in excess of 150 states involved in UNCLOS. Third, the process of decision is extremely complex, being part legislative, part bilateral and small-group negotiating patterns. In addition, the process is highly ritualized. Fourth, the subject matter under negotiation is highly technical yet extremely broad. It concerns control of virtually all ocean space and ocean uses. Few delegates were prepared by previous training to handle adequately the technical aspects of the questions under discussion. Fifth, it is impossible to exclude nonocean elements from playing an important role in the decision considerations of a number of participants. For example, some delegates wanted to use the oceans to create fiscal solvency for the UN and many delegates wanted to use control of access to ocean minerals as a lever to create a new international economic order.

The large number of issues, the staggering number of delegates whose voices had to be heard, the difficulty of the subject matter, and the "mixed" system of decision created an environment in which coalitions had to be formed before any action was possible. Delegates found that they could not treat all issues equally; that is, they had to "tradeoff." Success on some less salient issues had to be sacrificed for success on more salient issues. Finally, elaborate packages of most of the major issues had to be constructed in order to avoid the problem of cyclical decisions.[3]

The consequence of a parliamentary diplomatic decision process is that delegates find it slow-moving and therefore the transaction costs are very high. Moreover, they personally face problems of information overload that greatly complicate their own decision proc-

esses. The amount of signal (that is, valid information about the interests, performances, and strategies of other delegations) is surprisingly high and should be used as part of the first delegation's "outguessing regress."[4] But delegates have difficulty in remembering all relevant material, much less sorting signal from noise. They find in such a complex environment difficulty even in estimating the consequences of short-run tactical alternatives. Harder still is the necessity of fitting their alternatives into viable packages and then judging the probability of success of that package in terms of its adoption by the conference. Fitting the whole picture together into an overall strategy for the conference is the most difficult task of all.

It was the purpose of the LOS Forecasting Project to try to help U.S. delegates in as many of those steps in decision as possible — remembering as much relevant information as possible, sorting out the information, ordering the information, helping to find relevant information for U.S. delegates to use in their own personal estimates of the outguessing regress with others, estimating the alternatives, trade-offs, and packages, and putting the strategic "picture" together. We had demands at three levels of intellectual difficulty placed upon us. While they were sequential for us as researchers, in that we could not provide work at step three without successfully solving the problems at steps one and two, we were also asked to put out usable products at all three steps.

The first was descriptive, where we could act as information gatherers and purveyors. The second was analytic,where we could say what delegations were already doing individually and collectively. The third was prescriptive, where we could forecast what states probably would do if they continued their present courses, and forecast in the light of "what if" questions posed about U.S. and foreign options on individual issues, trade-offs, and packages, including "optimum" packages to promote consensus.

Step one of the LOS Forecasting Project was descriptive. We collected, stored, and reported out data. At this level we provided the services normally associated with a management information system. The issue data we collected was derived from the official UN verbatim and summary records as well as from U.S. diplomatic cables. The information was extracted by a process called thematic content analysis. The material was hand-coded in order to be as flexible as possible. In addition, the system was designed so that a person relatively untrained in social science techniques, such as a junior foreign service officer, could learn to code properly within a short period of time. We also collected statistical data concerning the general political and economic attributes, as well as "ocean" attributes, of participating states. To manage these materials, we created a versatile set of computer programs. They stored, manipulated, and reported out these materials both for the project's next stage and for direct consumption by Task Force members. We could and did provide national profiles, theme profiles, and retrieval profiles (so that the exact original remark could be found). We did complete runs which included everything in storage, or reported out selectively only what the consumer demanded.

In step two, we did analytic work. We summarized national positions (quantitatively). We provided estimates of where events were on all issue areas for which we had good data. We also attempted to provide clues on causality of the behavior of individual states and caucusing groups.

To analyze, we had to proceed through four subordinate steps: (1) to create analyzable data from our raw materials; (2) to develop a model to summarize national positions; (3) to create a method to fill in missing data; and (4) to develop a means of measuring group behavior.

We solved the first problem by scaling our verbal data on a particular issue along a conflict spectrum. The most extreme bargaining offer was placed at one end of the spectrum and the most extreme counteroffer at the other

end, with incremental compromises moving toward each other as they approached the center. It began as an ordinal scale and was transformed into an interval scale. Using the ranks and frequency generated on our conflict issue, we calculated a weighted average for each nation-state that spoke on the issue. Since not all states eligible to participate did participate, we have to estimate what they would do if they exercised their right to participate. We assumed that the states for whom we had no data would adopt the same posture as states for whom we had data when they shared certain attributes. Thus, we used a linear regression model to generate estimates. The opinions of states who spoke were used as the dependent variable and the attributes (general and ocean-related) of states as the independent variable. Finally, we calculated the means and standard deviations of known caucusing groups over time periods. A group mean could tell us the substantive group stance. Any change in mean would demonstrate if a group was changing its position. The standard deviations could tell us about group discipline.

We provided a considerable volume of analytic work for our sponsors. We regularly estimated what state preferences were on all issues or, if asked for a specific analysis, only on issues for which analysis was requested. We estimated what the outcome would look like on issues if the decision was to be taken in the near future. Finally, we estimated the positions and solidarity of coalitions on the issues.

Step three was technically the most difficult. We projected outcomes on individual issues, trade-offs, and packages, assuming all states would act as they said they would act. But we also developed a capacity to manipulate the modeled situation, which allowed us to answer "what if" questions. Thus, we could construct better — or worse — packages in terms of acquiring a requisite majority under conditions of states behaving as we believed they would. We also developed a model for forecasting the direction and distance of movements in packages toward consensus.

To forecast, we had to: (1) create a model of preferred positions of states; (2) model the probable outcome on individual issues; (3) model the outcome of packages and trade-offs; (4) model the direction and speed of the movement of a package toward consensus. The first we solved by a model which weighted a state's expressed position heavily if it mentioned its position often (demonstrating the salience of that issue to the state); weighted its expressed position lightly if it mentioned its position infrequently and consequently weighted its estimate more heavily, and used the estimate alone for a state that did not express itself on the issue. We measured the outcome on the individual issues by: (1) plotting the distribution of national preferred positions; (2) measuring the median and using it as the best simple measure of most likely outcome; (3) creating utility pairs so that we could measure the support for two contending bargaining positions on the issue. Estimating the outcomes of packages and trade-offs required more sophisticated models, which took account not only of the state's preferred positions on a number of issues simultaneously but also the comparative saliences. Estimating what would be required to move a package toward consensus and how fast it could move required even more elaborate models. They cannot be explained here.[5] We need only remark that what we created was a powerful array of research tools that provided a greater information, analytic, and forecasting capacity for the U.S. delegation than has ever existed before for a U.S. delegation accredited to a major international decision conference.

The development of the conceptual framework and many of the descriptive, analytic, and predictive techniques began at least three years before the formal establishment of the Law of the Sea Forecasting Project in 1972. The need for similar techniques was evident in an earlier project I conducted, concerning the U.S. bargaining position on the Seabed Arms Control Treaty negotiations. At that time, I and Joseph B. Kadane (now professor

of statistics and chairman of the department at Carnegie-Mellon University), who was my chief collaborator of the Law of the Sea Forecasting Project, were on the professional staff of a "think tank" that did analytic work for the U.S. Navy. Thus, we had both a customer for our work and resources with which to do the work. I was also aware that the State Department had informed the Navy that it intended to reopen the question of inadequate treatment of certain problems in the Continental Shelf Convention of 1958. This meant the possibility of going back to conference in the forseeable future. Since I did a doctoral dissertation on the 1958 and 1960 Law of the Sea Conference bargaining and concluded that those earlier meetings were barely manageable, I was concerned that no potential participants would — without help — be prepared for a bargaining situation ten years later that would be even more complex.

The project began formally in the winter of 1972. At that time, representatives of the staff of the Chief of Naval Operations (OPNAV), the Naval Judge Advocate General Corps (the Navy lawyers), and a Navy admiral dealing with Law of the Sea matters for the Joint Chiefs of Staff (JCS) concurred in the recommendation that the think tank add a Law of the Sea forecasting project to its study program. By spring 1972, the State Department became aware of our efforts and asked for a briefing. The briefing went well. The State Department, on behalf of the NSC Task Force, decided to sponsor our project jointly with the Navy. However, because of the small external research budget available to the State Department, their sponsorship amounted to "piggybacking;" that is, the State Department paid only a small fraction of the actual costs of running the project. They supported our work for two years. Their official sponsorship was important to them, because despite the low dollar amounts their contract with the think tank allowed them direct access to the members of the study group. They did not have to interact with us except via the Navy.

During the period 1972-1974, the study group was at the peak of its productivity. We poured out descriptive profiles. We provided complete analyses and forecasting "briefing books" before each bargaining session. We answered analytic questions posed us on the major conference problems by OPNAV, JCS, DOD, and State. Because of close interaction between the study group and the ultimate users of its products, we developed a number of analytic and reporting practices, to be described below, that solved or ameliorated a number of potential research utilization problems.

For the two-year duration of our State Department contracts we had dual reporting responsibilities. On the military side, we reported to DOD Task Force on the Law of the Sea, sometimes via the branch of OPNAV responsible for Law of the Sea problems, sometimes directly via the DOD (ISA) or JCS representatives. On the other side of the Potomac, we reported to the NSC Task Force on the Law of the Sea via its Working Group on Informations Systems, housed in the State Department. The Task Force was managed by a trained research analyst, an economist, borrowed from Treasury. While he had the appropriate credentials to administer the Task Force's research effort, he was looked upon by the military representatives as the delegate of the "enemy" on the Task Force, since DOD and Treasury had already begun a furious internal struggle over the basic direction of U.S. LOS policy. Very soon after this arrangement was established, our research project was perceived by the military representatives as having joined the enemy camp.,

But our major problems began when the Navy admirals representing JCS, whom I shall call Admiral Sea Dog and Admiral Lawyer, were rotated out in 1973 and replaced by Admiral Diplomat. To put it mildly, we never were able to establish a close personal relationship with Admiral Diplomat, as we had with his predecessors. We had always gotten along with and cheerfully worked for our sponsor, although we sometimes brought evil tidings and sometimes differed on the per-

ception of DOD or Navy interest or the optimum strategy to carry them out. Mutual respect and trust existed. We tried to establish a similar relationship with Admiral Diplomat but failed. Our situation worsened in 1974, when our other major user, a senior member of the DOD (ISA) LOS Task Force, left DOD employ.

We were aware of the position we were in, and made a conscious effort not to engage in skirmishes with LOS participants on any subject but the meaning of our analytic and forecasting results. Still, we ended up in the middle of a series of bureaucratic political incidents. The first major incident concerned a representative of the Office of Naval Research (ONR) who, after a briefing by our research team, rushed over to the Task Force and asked for direct participation of ONR on the Information Systems Working Group. The JCS and DOD representatives were furious, because they were having difficulty in controlling all of the DOD fingers in the Law of the Sea pie. First, the Navy as an institution (but not uniformed officers as individuals) was eliminated as a direct participant in the Law of the Sea negotiations. Second, the military was a microcosm of the ocean interests of the U.S. as a whole — with separate Navy, Air Force, and Army operational interests, transportation interests, legal interests, and research interests. What the DOD and JCS representatives feared was that ONR wanted to state a separate position on ocean research rights. As far as I was able to determine, this was not their intention at all. In our briefing to ONR (a routine requirement, since ONR funds research in think tanks) we complained about the quality of our computer hardware. ONR indicated willingness to help improve our computer capability for the Task Force as a whole, but wanted to consult with the Information Systems Working Group before making a decision. When informed of the brouhaha they caused, they apologized profusely and ceased their attempt at separate representation. They also dropped their offer for improved computer hardware.

A second incident I let pass more quietly. I was invited to attend the Caracas session of the Law of the Sea Conference under our State Department contact. My name was on the official advisers list. Under pressure from the Pentagon, I was told informally by phone that my name was removed from the list. In order not to exacerbate the situation, I did not protest. If one takes the king's shilling, one expects to accept the king's discipline. But being barred from Caracas and prohibited from publishing any articles on Law of the Sea matters seemed excessive. Neither participating nor publishing was a considerable professional blow.

The Caracas cancellation, I now see, was part of a growing trend of controversy and difficulty for the project. The next incident concerned the misquoting of remarks I made.

In February 1974, at the request of a senior DOD (ISA) representative to the NSC Task Force, I gave a briefing at the State Department that outlined the types of capabilities we had, the services and products we could provide, and our latest "forecasts" or statements of how well or poorly the major U.S. proposals were doing in terms of the preferences of states at that time. Several days later, my phone began to ring with irate calls from JCS, DOD (ISA), State, and several other places. It seems that a senior official from the Economic Policy Board of the White House had written a letter to the Secretary of Defense which included a phrase which I paraphrase from memory: "DOD cannot achieve its security objectives at the Law of the Sea Conference. This is demonstrated in the study done by your own think tank."

I did not say that at the briefing. After a bit of checking, I found out the junior official who prepared the letter for the signature of the senior official had not even attended the briefing. All materials used at the briefing had been prebriefed for the Navy, JCS, and DOD representatives, or their staffs. A number of military representatives attended the briefing and heard what I did say. But the damage was done.

The fact that I did not say what the letter alleged I said masks a classic research utilization problem that I will discuss in more detail below. I did not say what was alleged because the data did not indicate such a statement would be true. But what if the data did indicate that such a statement, if made, would have been correct?

By 1974, the capabilities of the project for data management, analysis, and projection improved almost weekly. We were successfully processing large amounts of information, and turning much of it into usable data. We were consistently developing new wrinkles in our analytic and reporting methods. Our forecasts were authoritative in the sense that we had a track record; our earlier forecasts proved to be accurate. Nevertheless, we encountered further difficulties.

The next problem was that the State Department contract was not renewed. I was later told there were many reasons why the External Research Office of the State Department did not renew the contract, many of which had nothing to do with our particular project. But, whatever the reason, we lost our direct pipeline into the NSC Task Force. The only manner in which our work could officially be disseminated was via the Navy to DOD (ISA) or JCS, and from them, at their discretion, to other members of the Task Force.

Within weeks of the end of our direct relationship with the Task Force, our services were needed. Admiral Diplomat asked the member of the Task Force from the State Department Research and Analysis (R&I) Division to conduct a study on the bargaining relating to the major security issues being dealt with by the LOS Conference. He was promptly told that R&I did not have the capability to do such a study but that the Navy's own think tank did. After much bargaining through a third-party intermediary, we were commissioned to do the study, with the State Department R&I man as coordinator. We did it. We were then invited to brief it to the NSC Task Force. But at the last minute the DOD (ISA) representative canceled the briefing, claiming that only he himself or Admiral Diplomat should speak for the Department of Defense. Of course, it would have been indefensible if I had claimed to speak for the Department of Defense. I never did so. But, if I spoke at all, I had to speak on behalf of the data. As might be expected, even the State Department R&I representative who supervised our work never received a copy of the study.

The nadir came in May 1975. After a session of the Law of the Sea Conference at Geneva, Switzerland, syndicated columnist Jack Anderson published excerpts of a report that Congressman John Murphy, Chairman of the House Oceanographic Subcommittee, wrote concerning the session. In that report, Anderson claimed that Murphy was appalled that my think tank "spent $400,000 of the American taxpayers' money to computerize data so the . . . think tank . . . could predict," and that the Department of Defense "refused to share its computer predictions fully with other U.S. agencies at the conference."[6] This refusal, Anderson claimed, put the Treasury at a disadvantage in pushing its views. In the Murphy report itself, Congressman Murphy claimed "that the Treasury Department has made efforts to contract for the information with the Navy but it was disallowed."[7]

Were Anderson's and Murphy's charges correct? From my personal experience, part of which was reported above, I can state that the reports had a basis in truth. As a ballpark figure, $400,000 for the cost of the project was not out of line, although the work done under the final $73,000 was "suppressed." Was it suppressed? Probably, although I have no direct knowledge of whether it was, since I could not send it beyond the Navy. Was the Treasury thwarted in contracting for our services? Possibly. Preliminary discussions were held between Treasury officials and think tank personnel in which the Treasury officials were informed we would be glad to provide services via the Navy, or contract with them directly if they secured Navy permission for such an arrangement. But there is no evidence

that Treasury either officially requested that Navy share our analyses with them or requested that Navy allow them to contract directly with us.

After the incident I decided to wind up the project. It was a good time to do so. I was unwilling to undergo any further harassment, and it was clear that although the work technically was better than ever, we were permanently locked out of the policy process and the work would have little or no impact. In addition, in the next LOS session, the delegates went into private meetings in order to produce the so-called Single Negotiating Text, the "urtext" of a potential treaty. Thus, verbatim and/or summary records of proceedings were not kept or those that were kept were not informative. State Department cables also became less informative concerning the preference of foreign states. The major sources of our data dried up. While it would have been possible to devise new data collection efforts, they would have been difficult, expensive, and, under the circumstances, probably futile.

Research Utilization Problems: "Muddling Through to Modeling Through"

If I am correct in characterizing the Law of the Sea Forecasting Project as a scientific success and an applied failure, the history of its successful and unsuccessful adaptations necessary to fulfilling the research lessons for those interested in the proper production and utilization of policy research. Throughout the life cycle of a research project, the researchers have opportunities to succeed or fail to succeed in dealing with a number of critical problems, often in sequence. They can ask the right questions or not, they can use the right techniques to measure or not, they can collect and analyze appropriate data or not; their findings may be timely and/or relevant or not. In the process of moving through these steps in producing a research product, the researchers can also run into ethical difficulties, they may fit well or poorly into an organizational structure for reporting or other purpose relating to the research; they may have difficulties communicating with clients or may have personality clashes with each other, with clients or other persons involved in the research problem.

Ten problems of moving from "muddling through" to "modeling through," identified by Francis Hoole and myself, form an appropriate framework rather than definitive. As we shall see, a number of problems we encountered cross categories. Some show clear sequential linkages; others are outlying.

Some of the problems are more critical for some research projects than others. Below is a checklist of the importance of each of these problems to the successful completion of the work of the Law of the Sea Forecasting Project. The criteria for making comparative judgments were twofold: first, whether solution of the problem made a major difference to our technical capability for solving the substantive questions posed; and, second, whether solution of the problem made our work more usable by the customer. For applied policy research both are extremely important.

Table 1. Research Utilization Problems of the Law of the Sea Forecasting Project

	Critical	*Serious*	*Minor*	*Few/None*
1. Meaningful Focus		x		
2. Measurement			x	
3. Data Collection			x	
4. Data Analysis				x
5. Relevance of Findings		x		
6. Timing			x	
7. Ethical Problems	x			
8. Organizational Problems	x			
9. Personality Problems	x			
10. Communication Problems		x		

Let us discuss each of these categories in order.

Meaningful Focus

Policy research must begin with one or more meaningful questions for analysis. They can be identified by policy-maker or analyst; but if not stated in the research design in order to focus the analysis, the analysis may ask no important questions at all, or irrelevant or trival questions.

A study concerned with a manipulative bargaining problem must begin with the question: How should country X maximize its "utility," or payoff preference, or, more broadly, its "interest"?[6] Thus, it is necessary to state what that "interest" is. Many of our clients had difficulty in stating a firm interest, or were later embarrassed when they discovered the interest was not so firm as they believed.

There are many reasons why negotiators representing their countries have great difficulty in answering such a question for analysts, thus providing them inadequate guidance for their work. For one, the problem under negotiation may be so new or information so poor that firm decisions by the leadership of a country on what its interests are have not been made. Then the interests are defined only in the external bargaining. For another, when there are internal conflicts evident within the domestic leadership, concerning which of a number of interests should prevail, it is difficult to state an interest at all. It is not surprising, therefore, that some states change their external interests when some former domestic losers reverse their internal fortunes. Nor should it be surprising when a state that "lost" on an externally stated interest, preferred by only some of the concerned internal factions, rests content with the outcome. It is also possible for a leadership to "mistake" its interest or utility. Finally, some states are so wealthy or have so many policy options that a great variety of outcomes would be reasonably satisfactory for improving if not maximizing its "interests."

The problem of utility measurement for providing a meaningful focus to bargaining analysis is endemic in the literature of game theory as well as to our experience in attempting to provide bargaining analysis to the negotiators of a state, such as the United States, with many interests. Actually, there are really two questions that should be answered in order to sharpen the focus of research: *What* is the interest to be maximized, and *how much* do the individuals making the decision prefer one outcome over another? In formal gaming, the answer is simple. You "fix" the utility and it does not vary throughout the game. We had great difficulty in emulating this practice. But is was clear from the inability of our customers, sometimes because of mushiness of their information or at other times because of internal stress, that they could not always answer the first and, more frequently, could not answer the second. Under these circumstances we had to "fix" the preferences in our work by making an explicit assumption. A related device we used when possible was to test multiple possible utilities. Thus, we had to play a major role in framing our own questions for analysis. While this was an important problem, I do not feel it was a critical problem. I suspect that researchers whose training makes them conscious of the strategic factors are more often than not doing a major part of the research task for which they were hired by helping decision-makers frame the questions relevant to the overall strategy of a complex negotiation.

A related problem that we faced in the Law of the Sea Forecasting Project was that too few of our customers had a strategic sense, and/or knew how to properly employ a research project whose orientation was strategic. For them, the whole (an agreement on all 100 or more issues) was merely the sum of the parts. Their professional task was to get the best agreement possible on one or more of those issues. Thus their focus was how to persuade Ambassador X of Country Y to move toward what they perceived to be the U.S. interest when they met next in a bilateral face-to-face bargaining session. They rarely asked: How does my tactical problem fit into

the overall strategic problem and therefore what is the spillover to the tactical from the strategic? What they wanted from us was the answer to *their* question: What offer or threat should we employ to move Ambassador X to accept our position? While this was legitimate, and indeed an important question, it was not one for which we had a formal bargaining model. It would have been possible to develop such a model, based upon game theory. But we would have had to add a whole new intellectual focus to our project and solution would have been expensive. We could and did provide information and data so that the U.S. diplomat was better prepared to make his own judgments concerning his tactics, but we could not say if you do X, Y will happen. Despite our ability to provide useful clues on the interests and some of the sources of a foreign diplomat's behavior, the project was looked upon as less useful than it should have been to those customers who wanted determinate answers on questions of tactics.

A third problem of meaningful focus we faced related to the difficulty some of our users had in framing questions appropriate to our techniques. For the most part, these resulted from one or more of the following: uneasiness with a quantitative approach, lack of relevant training, or shortness of time for very busy senior officials. Central to our method was the construction of a "conflict issue." We initially had great difficulty in getting U.S. delegation members to participate in framing the conflict issue. But when we did get some to participate, they usually found the exercise enlightening. That is, not only did they help us, but the exercise gave them a firmer grasp on the structure of the issues. To create issues we scaled the statements of outcome preferences of states. First, we ordered the statements on a spectrum that had at the polar extremes the maximum opposing viewpoints, with less extreme views arrayed between them in order of their relationship to the two fundamentally opposing views. We then changed the ordinal scale to an interval scale in which we skipped numbers (or, as we called them, policy spaces) to approximate *how close* or *different* were the policy ideas that were in the correct order from the ones on either side. Technically it worked well. But it did require time and, for the untrained person who was not accustomed to what we are doing, a leap of faith to believe that what we asked them to do was intellectually meaningful and ultimately useful to themselves. Those willing to make the leap benefited. Many did not, preferring that we give them mere data sorted by some easily recognized criterion. Others, who still retained a belief in our analytic usefulness, often wished we could give them research results without any participation on their part.

Our adaptation was not to eliminate the client from helping to frame the conflict problem but to reduce the time and effort he had to devote to assist us to assist him. We did a first "cut" at the scaling of conflict issues and then presented them to our users for approval, disapproval, or revision. It was rare to have our preliminary scaling effort thrown out as completely inadequate or an unrealistic approximation of the general problem. Much more frequent was a willingness of our clients to adjust or finetune the details. They found that if we supplied the basic order and spacing, they could make revisions that reflected their view of the conflict problem. We believe this worked well.

Another problem that falls into the meaningful focus category is a classic problem of research focus. We worked in the tradition of W. I. Thomas. That is, we treated as real what diplomats said they perceived to be real. We forecast what we thought statesmen would do if they acted upon their perceptions. We had demands placed on us to change our focus, to forecast what statesmen would do if they were perfect economic self-maximizers. That is, we were asked to forecast how states would decide *if* they accurately understood their economic self-interest and *if* they allowed their economic self-interest to drive their entire position. It is possible to model the perfect self-maximization assumption with a simul-

taneous equation model. Upon request of the chairman of the Information Systems Working Group, we did so. It was a useful exercise and it performed a legitimate requested service. It was useful if a U.S. diplomat attempted to demonstrate to other states what the other state *should* do if that state understood its individual economic self-interest. But we did not allow ourselves to be diverted from what we believed to be the main task of our project — forecasting what states probably would do if they acted out their perceptions.

Among our more sophisticated clients there was an awareness that the focus of the project could be manipulated for ends other than high-quality research results. We always had to be alert to attempts to trivialize our research focus, not because those who wished to push us into a trivial analysis did not know better but because they knew only too well that to ask meaningful questions was to ask questions dangerous to their perceived interests. Before most major forecasting tasks we undertook, we usually had a skirmish with those who tried to redirect the focus or, failing that, control the dissemination of the results. I will discuss below the problem of the researcher under contract having little control of the dissemination of his product once the research is completed. Unfortunately, there is little a researcher can do under those circumstances about distribution problems. But he can fight for studying a meaningful problem, or refuse to do the work at all.

Measurement

Although we faced some measurement problems that were reasonably serious, I believe that over the history of the project we solved those that, had we failed, would have cast serious doubts on the accuracy of our results or made the results less useful to the members of the delegation. I believe we used measurement rules appropriate to the problems or that were close approximations of the ideal measurement rules for the classes of problems with which we dealt.

But not everyone respected the letter or the spirit of the measurement rules used. Users ignore our caveats or stated assumptions on numerous occasions. This was a very annoying problem. When the professional forecaster states the problem in the following form: *If* a giant asteroid were to collide with the earth, *then* human civilization *would* be destroyed, and he hears his clients claiming that the forecaster has predicted the end of the world, and this statement is made in the form of a universal truth, he sometimes wishes that indeed the asteroid would strike. Unfortunately, this is another occupational hazard of the analyst or forecaster.

Below are listed some measurement decisions we made that were based upon correct assumptions or perceptions that resulted in the creation of appropriate models:

- The LOS Conference is highly structured, and therefore structural models can be used to forecast.
- We could develop adequate data about states' perceptions from the public record given a sufficient body of data over time. In other words, states usually had to reveal their true positions and we could capture them by content analysis.
- The conflict issues were essentially linear; scaling would adequately represent the offer-counteroffer nature of the process.
- Within our scaling system, "policy spacing" would help replicate the negotiators' perceived world.
- A simple weighted average would adequately represent the position of those states that took a position on an issue.
- Our preferred position measure in the forecasting model (using estimate alone when we had no data; using estimate and data with a large amount of data and weighing the data heavily; using data and estimate with a small amount of data and weighing the estimate heavily) compensated well for small amounts of random

preference data which might have deceived us.

- We could get correct estimate of probable position for state who did not speak with system for accounting for missing data. Assigning to those who did not speak coefficients derived from those states who did speak and with whom the nonspeakers shared attributes worked well.

We did not solve all our measurement problems, although none of our less successful measurement decisions were seriously debilitating. However, if circumstances had been different we might have encountered serious difficulties. There were four problems.

First, if the issues of the LOS Conference had gone to voting, we did not have an adequate formal voting model to measure probable outcomes. A formal voting model measures the preferences of the voters on the item up for vote versus their preference for the status quo. We were never able to develop an estimate of the status quo. Our measurement model was a bargaining model which asked whether participants preferred one proposal over another.

Second, we had a static model for a dynamic situation. We had to assume that the delegates would behave in the next session the way they said they would behave in the previous session. This was not seriously debilitating because opinions changed so slowly on most major issues. Our adaption here was adequate; we did time-series analysis in lieu of true dynamic modeling.

Third, we had difficulty in stating unequivocally to our customers what caused or "drove" the position of their opponents. As I mentioned earlier, we could provide useful clues, but not definitive answers.

Fourth, we did not develop an adequate microanalytic forecasting model to go along with our macroanalytic model. Our emphasis was on the overall outcome, not what any single opposing delegation would do in bilateral negotiations with a U.S. diplomat. A game theoretically based model might have been developed that would have done the job, but we lacked time and resources to do both micro- and macrowork, and chose to stick with our best capabilities.

Data Collection

I think we solved almost all the technical problems of data collection that arose. The data we chose to collect was available, highly reliable, and meaningful to our customers. Our method of collecting information and turning it into data was highly successful.

In planning for our data collection effort, we listened carefully to our potential customers' statements of needs. They wanted raw information and slightly processed data supplied (so that they could do their own estimates and analyses), as well as the research group's forecasts. For two major reasons we accommodated them and adapted our data collection methods accordingly. First, with careful planning we could do both, supplying their need and ours, at low cost. Second, by our data collection methods we had to create confidence, on the part of our users, in the quality of our analytic and forecasting output. Often nonspecialist users of our forecasts based their decisions about the accuracy of our findings on that part of the research process they were best capable of understanding, given their training. This usually was the quality of the data rather than the measurement rules used or analytic or forecasting models employed.

We made a number of important data collection decisions in reference to our users:

(1) We did our thematic content analysis by hand. Hand coding gave us flexibility. Moreover, a novice with no quantitative analytis could be taught to be an adequate coder within several weeks.

(2) The way in which we coded was a more organized version of extracting information from documents, which is already commonly employed in many government agencies when a junior person is asked to assemble information for a report. Our im-

provements allowed the information we collected to be retrievable and reusable for more than its original purpose.

(3) We consciously used materials as the sources of data that were the same as the negotiators. If we used "exotic" materials, not normally used by our negotiator customers, the believability of our forecasts would have been in jeopardy.

(4) We transformed the format of our data as little as possible so that our clients could use the data in the same format as we did when we went into an analytic model — e.g., scaling which changed the data at that step into rank numbers.

(5) We solved our missing preference data problem with good attribute data (also directly usable for descriptive purposes by our customers) and our regression model.

(6) We created versatile data management computer programs that allowed us to turn out a great variety of useful descriptive products.

(7) We went to the trouble of conducting formal quality control and reliability checks on our data. These checks showed the data to be of very good quality.[9]

Our biggest disappointment concerning data collection, however, was not related to accomplishing the data collection goals of this project but to our goal of providing the State Department with the capability of acquiring data for all future multilateral conferences. We hoped to pass on our system to the State Department so that they could prepare inhouse data for all future conferences at low cost. One important role of a think tank is innovation. It is questionable whether a think tank should routinely carry out a function that must be carried on persistently within a public bureaucracy, such as gathering data for conference preparations. One reason we put a premium upon developing a data collection method manageable by persons with little training in quantitative techniques was the hope that we could show the Research and Intelligence Branch of the State Department that we had a process that could be useful to them for many conferences. Alas, we saw no interest in adopting our data collection system.

Data Analysis

The Law of the Sea Forecasting Project experienced very few data analysis problems, certainly none that brought into question whether we could accomplish our established analytic or forecasting goals. What few problems we encountered related mostly to the measurement problems discussed. Since they never became important, we experienced only minor difficulties.

Perhaps the major reason there were so few problems was the complementary experience of the two principal investigators, the spread of their skills over the needed range of skills, and their trust in each other's judgment. Friedheim knew the substantive problems of ocean management and the bargaining process of UN conferences. Kadane knew statistics, formal modeling, and the basic mathematical underpinnings of the methods we developed.

Relevance of Findings

If a researcher asks the right questions, has no important measurement problems, has appropriate data, and does the analysis correctly, it is highly likely that the research findings produced should be relevant to the decision problem at hand. We believe that our work was relevant to the making of virtually the full range of strategic decisions on the separate major substantive issues, as well as the trade-offs and packages. Also, we believe that our forecasts were as conclusive as any predictions before the fact could be, as demonstrated by a *post hoc* examination of the decisions implied in the so-called negotiating texts.

Yet we did have problems of alleged lack of "relevance," originating mostly from those losers on the internal trade-offs that had to be made. As they put it, the techniques used were merely "experimental" — ergo, they were not conclusive and therefore should not be rele-

vant to the decision. In short, we faced the problem of the messenger to Belshazzar. In emulation of Belshazzar, various U.S. government Law of the Sea officials tried, at a minimum, to remove our results from policy consideration and, at a maximum, to remove our heads.

Despite the obstacles put in our path, I doubt that many of those who, for their own advantage, characterized our methods as "experimental" truly believed that our findings were not relevant. The basic problems faced by us as researchers and by them as users were to find the right context in which (1) our findings could be brought into consideration with all *other* factors relevant to decision; and (2) the relevance of our findings could be considered at an appropriate time in the decision process.

We were always aware that while our work was relevant, it was not the only factor to be considered in making LOS decisions. Forecast of the probable collective decisions of an international conference must be weighed along with other relevant considerations. But forecasts of how opposing delegations probably will treat proposals tend to have a forcing effect. That is, they raise immediate questions about the soundness of the judgment of the official who wishes to act contrary to the forecast.

Often there are important — and, I believe, legitimate — reasons to act contrary to the forecast (as well as reasons I would not consider legitimate). At times, the "losing" position is so highly salient to a negotiator's home government that he and his masters would rather see it "lose" internationally than brook any further bargaining compromise. At other times, the pressures of a negotiator's domestic client groups to defend their interests as they perceive them is so intense that the negotiator is forced to hold out to the bitter end on a losing position even though he is well aware in advance that there is little hope. Knowing he probably could not "win" would not save him from being accused of "selling out" his clients. In those situations he believes his country must swallow its defeat before he can successfully recommend a new policy course. Usually, these are motives a negotiator cannot openly reveal in the interagency cut and thrust. If a forecast is available to all major domestic participants, he fears he will be made to look foolish if he persists in supporting a shaky position. This is a problem for which we had no adequate solution. Whether it is solvable depends heavily upon one's perception of whether the policy process is rational or cybernetic. The rational-cybernetic controversy and our fumbling attempts at adaptations will be discussed under the organizational category.

We also had a problem in advising our clients as to what part of the decision process our results were relevant. Forecasts of probable outcome could be used for management information and planning purposes early in conference preparations, or they could be treated as short-term forecasts of outcome just before the event, or they could be treated as both. Early in the preparations of our project, partly because of the belief of the negotiators that the LOS Conference would last only a few sessions and decisions would be made by vote, and partly because we seduced ourselves with the excitement of trying to create a real-time forecasting system which could provide estimates of voting outcome just before the event, we did not balance out our obligations as well as we should have.

We were not totally naive about the relevance problem of short-run forecasts. Again, Robert Frost has described this problem well:

> *As for his evil tidings,*
> *Belshazzar's overthrow,*
> *Why hurry to tell Belshazzar*
> *What soon enough he would know?*

Forecasts of short-run outcomes, even if accurate, have limited usefulness. In our case, their usefulness was particularly limited because the expectations about voting ended up being wrong. Except for some votes in the Twenty-fifth General Assembly concerning the conference, and a vote in the Seventh

Session concerning the retention of H. S. Amersinghe as president of the conference, decision-making has proceeded thus far by a consensus of near-consensus rule.

Hindsight now allows us to see that the greatest relevance of our findings was for planning purposes. We could ask "what if" questions. We could manipulate a large number of issues which required coordinated decisions. We could provide a clear view of the strategic rather than tactical options available to U.S. LOS decision-makers. Although we were aware of the value of our results for this purpose and did a number of studies for precisely this reason, we did not make our project goals as clear as we perhaps should have to the delegation. With a better mutual view of the most appropriate use of our work, perhaps we would have encountered fewer difficulties.

Timing

Problems in the timing of studies can occur in any state of a research project. The most important possible consequence that can occur, however, is in the final or reporting stage. If the results are not ready when needed, however splendid the scientific quality of an applied study, essentially it is an unsuccessful study.

We encountered minor timing problems. Most were mere annoyances, albeit persistent annoyances. However, we had a three-year headstart working in our favor; had it not been present we might have had a fatal timing problem.

It would have been impossible to have ready a fully developed methodology for forecasting the outcome of a large-scale multilateral conference at the time of the Caracas session in early 1974 had we begun only when the LOS Task Force perceived a need for forecasting help, in late 1972. The project required a substantial effort to collect a large body of data about the preferences of states and a substantial set of data-management computer routines and forecasting models. It was possible to accomplish what we did only because of the special circumstances that Kadane and I were employed by a think tank having an existing contract with a party interested in the problem of ocean law. I was able to approach to president of the think tank in 1969 with the proposition that the U.S. Navy in particular and the U.S. government as a whole would need the capability to forecast large-scale multilateral negotiations. He was in a position to reply that if we were convinced that we could do it, we should do it. We did, and by 1972, when others first saw the need, most of our methodology was "up and running." We had to add much more data and we had to refine the models, but essentially we were ready when called upon.

With one exception that I will discuss below, most of our other timing problems fall into the "annoying" category. We join a long list of researchers who complain that users would prefer to have results reported in even before the users commissioned the study. This is another in the growing list of endemic problems. Analysts always believe that they are given inadequate lead time to prepare themselves or to actually do the analysis. Often they are correct. It is only when a decision-maker identifies the fact that he needs answers he at present does not possess that he authorizes a study. This is usually later in the game than a researcher would care to see such decisons made. The only thing a researcher can do is work harder in the limited time available and be prepared to participate in fire drills. We had a number of "tactical alerts," where a particular piece of work had to be done in a very short time. We got these done by keeping late hours and canceling weekend plans. A hazard of the trade.

We had one heartbreaking incident in which our customer's lack of timely decision as to when analysis was needed doomed to nonuse a truly exceptional piece of work. At the beginning of the weekend, before most of the members of the U.S. delegation left to attend the Caracas session in the spring of 1974, Kadane and I were asked to consult with

a senior member of the Task Force concerning the voting rule the U.S. should support when the session opened. It was a question that was raised but not resolved at a two-week organizing session of the LOS Conference held in New York in December 1973. What was wanted just before the Caracas session opened was a LOS Conference voting-rule formula that satisfied seemingly contradictory internal U.S. needs. The Department of Defense, confident of a favorable majority on most important issues of concern to it, wanted a voting rule that would make it easier to form requisite voting majorities on issues where the outcome probably would be favorable to the stated U.S. position. In contrast, the Treasury Department, fearful that it did not have a favorable majority on most important issues of concern, wanted a voting rule that would make it more difficult to form requisite voting majorities on issues where the outcome probably would be unfavorable to the stated U.S. position. After a weekend of work, Kadane solved the problem with a brilliant piece of analysis. We gave a briefing on the solution on Monday morning, seemingly to the great satisfaction of all. We were disappointed when the U.S. delegation never attempted to introduce Kadane's solution as a prospective voting rule. As we understood it, the U.S. delegation was afraid to introduce the Kadane solution for fear of being accused of insisting upon a new idea without providing necessary time for other delegations to study it. Indeed, this is probably correct. But there had been time to commission the analytic work earlier than several days before the decision had to be made. There were over six months between the New York and Caracas sessions. But they were not used to giving us lead time to solve the problem so there would be sufficient lead time to use the solution. A pity. The conference adopted a voting rule that for all practical purposes has the same effect as the normal UN "two-thirds present and voting" rule, even though it was, the delegates thought, so constructed as to avoid the consequences of the usual rule. But a minor tragedy of adopting a "bad" rule has been avoided, thus far, because of a limited frequency of conference voting.

Ethical Problems

Among the most persistent and critical problems we faced were ethical. We had to have answered, to our own satisfaction, the questions of whether it was fair or proper to do the project at all; who should have access to our results; who, if anyone, should be excluded from access to our results; who should make the decisions about who has access to our results; how many levels and locations of "masters" must we respond to; what was our obligation to speak the truth as we believed we knew it; and what should we do, if anything, if our clients ignored the results we provided them. We probably ran into more ethical problems than is common to most ocean policy projects. These problems arose mainly because of two factors. First, we were intimately tied into the decision process and yet we were not civil servants. Thus, we were closer to the decision process than most researchers, especially university-based researchers. Second, we dealt with process directly rather than indirectly. We had a manipulative model that could help distinguish probable winners from losers before the event. Yet the models had nothing to say about who on substantive or moral grounds "should" win. Thus, an ethically indifferent set of models forced moral choices on us.

We might have tried to ignore the ethical problems and hope they would never force real decisions on us. I did not feel comfortable with such an attitude. My only personal test is whether I was more comfortable with myself for having tried to answer the dilemmas, not whether I had the universal answers for the categories of ethical problems we faced.

The most central question we had to grapple with was: Is it ethical to develop a forecasting model that would, if our clients had understood its power, allow one of the parties to the LOS Conference to "manipu-

late" the conference? The model was designed to give its user the opportunity to maximize the chance of adoption of its preferred positions on the issues. In sum, superior information and forecasting should have given the United States a competitive "edge."

Early in the project, I discussed our prospective work at a scholarly conference. Several Canadian scholars present expressed concern about the advantage I would be giving the United States if I proceeded with the project. At other times, persons knowledgeable about the project expressed the wish that he UN Secretariat, rather than one of the member states, had the capability we were building. Presumably, the Secretariat could use it to identify the consensus position early in a prolonged negotiation and try to identify it as the world collective good. I thought about how I would prefer to reorganize the world political system, and decided that if one must operate under the present system, then it was legitimate to support the government of one of the members of that system, albeit one of the two most powerful members of the system.

Dropping down a level and looking at the U.S. government positions on LOS questions, we faced other ethical dilemmas. Could we as researchers work in the "national interest" while being paid by one of the subcomponents of the national system? Could we even identify the national interest much less represent it? What we produced as output could have been used as a "collective good," although it also could be used as a "private" good. We produced the output of the project, but were we in anyway responsible for whether it was used as a collective or private good?

Related is the question of whether we could speak for the data or whether we should or could speak for the Department of Defense. We *never* represented our analytic or forecasting results as the official position of the Department of Defense or any of its components. Nevertheless, at times we were damned because we didn't and at other times damned because participants either thought we did or still others thought we should have. Whatever difficulties we encountered by trying to talk to the data rather than for DOD were small in comparison to the problems we would have had, probably deservedly, if we had claimed more. We would have lost all credibility. As it was, think tanks are considered to be "captive" research organizations whose results are biased by their sponsorship. We could not avoid that imputation, at least at the beginning of the project. Only a high-quality analytical effort and a scrupulous regard for what the data said, rather than what our sponsor said, could help us build a reputation for accuracy and fairness.

A related problem was whether we could serve two masters. As we have seen, the study group had contracts with both the Navy and the Department of State. Our Pentagon masters were concerned lest we develop a conflict of interest. If what they meant was whether any analytic result could harm their interest if that piece of analysis got to other members of the U.S. delegation without filtering, then we did indeed develop a conflict of interest between ourselves and one of our masters.

We were willing to try to mitigate our problem of divided loyalties, but there was no way we could eliminate it. Our mitigating device was to allow our Pentagon sponsors a look at our results before they were passed on to users on the Washington side of the Potomac. Having a peek early allowed them to construct their arguments and defenses, if they deemed them necessary. Was it ethical to bite the hand that fed us? Was it ethical to give our chief sponsor (in terms of financial support) an advanced peek, even if we were unwilling to change a word of a forecast unless challenged on scientific grounds? I don't know the "right" answer, but I do not believe we would have been allowed to attempt to serve the entire delegation unless we were willing to make the "advanced look" concession.

We also faced a different ethical problem when we looked at the reciprocal of the situation. The State Department was "piggybacking" on our basic Navy contract. As piggy-

backer, the State Department was asking for and getting more than it paid for in terms of quality or quantity of analysis. Should we have devoted to State as much time as was necessary to solve the problems they presented us for solution?

Ethics, emotion, and one's notion of role are intimately tied together. My colleagues and I tried not to become too emotionally involved with the question of whether decision-makers used — much less, as we would see it, used properly — or applied the results of our analyses and forecasts. We never succeeded entirely. We believed that ethics as well as good sense required that an analyst or forecaster be given a hearing. What value is applied research unless the appliers hear what could be applied? We fought very hard to be heard. But we tried to draw the line on whether the decision-makers "owed" us obedience to our insights, or whether they merely owed us a hearing. In discussions among ourselves we agreed that we, as researchers, were owed nothing more than a hearing — we were advisers; others were appointed to make the decisions — and that, however pleasurable it was to see one's insights reflected in public policy, such pleasure was serendipitous. Nevertheless, a researcher still has an emotional commitment to his product. A researcher who does not feel the analysis is correct and therefore should be acted upon positively should not be in the business. This is an emotional hazard of the trade.

Organizational Problems

Problems that I have called organizational were so severe and persistent that they alone would have made me conclude that we were an applied failure. Although we tried to adapt, most problems within this classification were well beyond our control. They dealt with the fundamental manner in which the decision system was organized (structure), the manner in which decisions were made (process), and the types of behavior patterns participants thought were required of them (role).

Structure. The U.S. delegation to UNCLOS was too poorly organized to make consistent use of our superior forecasting and information-processing capabilities. It consisted of representatives of all departments and agencies concerned with Law of the Sea in which the State Department was, at best, *primus inter pares*. There was very little functional differentiation within the delegation. The focus of virtually all the members of the delegation was representational; that is, they were there to represent their departments on issues of significance to their organizations and bargain with other U.S. delegation members or with foreign delegates. Too few were assigned administrative, coordinative, or intelligence functions to allow the smooth operation of as large a group as the delegation. There were too few people with technical skills, and few standard procedures for receiving, processing, and disseminating information. The Information Systems Working Group had a fancy title with little substance; it never really functioned.

Our hopes of playing the role of developer of a new forecasting capability which we would "pass on" to the State Department for future operation was doomed from the start. There was no one to pass it on to. The Department's Intelligence and Research branch did not have personnel who could interpret the results we produced, much less take over the forecasting system we developed and produce their own results. The State Department had only one trained analyst associated with the delegation. He was the geographer of the State Department, a skilled and sensible person whose lack of other help or support took a toll on his health. He alone could not assure that the delegation request, absorb, disseminate, and act upon all relevant information.

Process. My previous remarks perhaps reveal a longing for a "rational" decision system. But it may be that what we experienced and observed was more akin to cybernetic decision-making.[10] It was a struggle over proposed actions, not an effort at assessing the alterna-

tive outcomes and choosing the one which had the best match with the United States' utilities, objectively determined. In such a process, as John Steinbruner pointed out, the decision-maker focuses on a few incoming variables and avoids any serious calculation of probable outcomes.[11] The LOS forecasting project would have allowed the Task Force members to calculate the probable outcome of the bargaining alternatives. It succeeded only in making Task Force members uncomfortable. It had the forcing effect I mentioned earlier. The delegation response was to screen out, by various mechanisms, the information we provided. One was the excuse that our method was "experimental." Another was not establishing an appropriate regular channel by which our forecasts entered the system. As I shall show below in discussing "role," a third was the strongly held belief on the part of many delegation members that their task was to succeed against the odds. As long as the project materials did not have to command the attention of the delegation, we survived, and the information and analyses we could provide were used, although by individuals who believed in the value of our work, not by the delegation as a whole.

Sometimes we could not be ignored, because of publicity or because some members of the delegation tried to bring our forecasts — or what they said were our forecasts; again, I point out our lack of control of dissemination — to the attention of the critical decision-makers. Then we were denied access to the delegation. The Treasury Department representative, an exponent of rational decision-making methods, tried to inject our forecasts into the process. He knew that doing this might cause the termination of our project, but he may have felt that the project had little usefulness if the results couldn't be used to attain "rational" decisions from the delegation.

Role. Role conflicts abounded at all levels between the project researchers and various categories of our users. Some useful insights might emerge from these conflicts.

The basic role conflict we experienced was between the negotiator and forecaster of negotiation. Theoretically, the negotiator's purpose is to make his principal better off with a bargained outcome than without. "Victory," or achieving an outcome at the expense of an opponent — a zero-sum outcome, where what you win your opponent loses — is not a requirement, except perhaps psychologically. Members of the U.S. delegation wanted to "win" the negotiation. They were aware that they had a difficult task to perform. They knew from the beginning that the odds were against a superpower attaining most of its preferred outcomes in a bargaining arena controlled by a large majority of poor, developing countries. But the U.S. delegates hoped against the odds to achieve the U.S. aims. Anyone who pointed out the odds was merely putting impediments in the way of achieving their goals. Our purpose as forecasters was accurately to state those odds. We would not have attempted to play the forecasting role unless we believed it was usually more sensible to play with, not against, the odds. This put us into conflict with those U.S. negotiators who wanted to play against the odds. They constantly complained of the conservative nature of our forecasts, which indeed projected into the future the patterns of the present. They hoped that acts of will could overcome even a poor tactical position. Odds are never certainties and occasionally those who play against the odds win. This knowledge buoyed those "creative negotiators" who hoped for breakthroughs when most observers had abandoned hope. Obviously a negotiator who succeeds against the odds has made a great step forward in his career.

The willingness to use our forecasting capability varied widely among the different levels of the hierarchy of the delegation. Perception of hierarchical role influenced how individuals from each level viewed information, analysis, and forecasting. We found a good deal of receptivity among the most senior officials and the junior personnel. Our most persistent critics and opponents were

found among the middle-rank officials — the advisers or the U.S. spokesmen who specialized in the work of one of the three committees of UNCLOS.

Since our project was strategic in its purpose, it fit the needs of the senior officials who were responsible for the general success of the U.S. negotiating position and who had to fit the parts into a coherent whole. They quickly understood what our analytic tools could do for them. Role conflict was at a minimum between ourselves and the most junior members of the Task Force. Since they were already at the bottom of the heap, we could not threaten their status. In addition, they were younger, less broken to the bureaucratic harness, more flexible, and, in a few cases, more broadly trained than older Task Force members.

We did threaten the status and challenge the skills of middle-rank Task Force members. Often they provided advice and "estimates of the situation" to the senior members. They were also living data and information retrieval, storage, and reporting systems. They carried an enormous amount of vital information in their heads. The LOS Forecasting Project also provided advice, estimates of the situation, and large amounts of useful data. In some cases, we could and did do better at forecasting and at supplying necessary information than our middle-rank rivals. Our forecasts could deal not only with individual issues but with most major issues in relation to each other (packages). On supplying information, we had the great advantage that a computer has over a human brain. If we collected and stored the required information and gave proper instructions to the computer, we forgot nothing when asked to report out the information.

In reality, our skills and those of middle-rank officials were complementary. We could do some things better than they and they could do some things better than we could. We could not — and never claimed to — replace the knowledge and skills of middle-rank officials as advisers. Since they participated directly in the negotiations, they had access to information and insights not available to us. We could gather and store only a rigidly organized subset of the totally available necessary information on the negotiations. Only human computers could collect and store information randomly on a wide variety of subjects, and rely upon human memory to report it out when a "retrieval" was requested.

Another important conflict was between ourselves as providers of analytic and forecasting services and the person who was simultaneously the Treasury representative and chairman of the Information Systems Working Group. This was a conflict of roles, not of personality. The individuals involved got along well. In trying to play two roles at once, the treasury representative/Information Systems Working Group chairman was damaging the role that involved his relationship to us. He was our contact point and therefore a purveyor of our work to other members of the delegation, and he was a partisan player in the interagency struggle, trying to maximize the utilities of his department. As our mentor within the delegation, his role was to control our work and, if it was satisfactory, disseminate it to other members of the delegation. He should have been able to vouch for its accuracy and its responsiveness to the needs of all segments of the delegation. His role should have been as our partisan. As a result of being a partisan of the substantive view of his parent departrment as well as our partisan, he was able to convince few members of the delegation not already converted to his substantive views to listen to our forecasting results. I do not know what the Treasury Department representative's mandate was, but if it was to play both roles, he was given two conflicting tasks.

A role conflict existed between the LOS Forecasting Group and the think tank that employed us. The think tank leadership understood well that its role was to assure that the study group did honest and technically competent work; it lived on its reputation. For that reason the managers of the think tank rigorously checked the adequacy of our work

and, since it passed their tests, protected us from external threats to the integrity of our work (demands to change or soften our findings) and from threats to our status (that is, threats to get me fired). However, the think tank felt that it was not part of its role to attempt to obtain the study group a hearing when threats were made to cut off the study group access to the LOS Task Force. As long as we produced competent, truthful, and timely work and our sponsors paid their bills, we were allowed to continue to produce analyses and forecasts. For a number of reasons elucidated earlier, we in the study group felt that it was part of our role to present our findings to those who would make or influence LOS decisions. Producing analyses for no known or identified user is all very well for the "pure" social scientist in a university setting, but it is not a well-regarded role for an applied social scientist employed by a federal contract research center.

Finally, and interwoven with many of the earlier role conflicts discussed, was the role conflict between buyer and seller of analytic and forecasting services. Buyers like to believe they should control what they buy. Analyses and forecasts belong to them to be used or disposed of as they please, even if they underutilize, ignore, or discard them. In a legal sense, the works produced belong to the buyer. Sellers of analytic services dislike recognizing that fact. But intellectual goods that are sold are sold with the seller's name and reputation on them. For as long as people are prepared to use them, the play they see is by playwright X, the painting they view is by painter Y, and the analysis they read is by scholar or analyst Z. Producers will always have a residual claim to the product of their hands or brains.

Personality Problems

Human beings produce analyses and forecasts for other human beings. Before such a relationship can work, trust, understanding, and some degree of personal empathy must exist. If it exists it must be sustained. If it never existed or it if breaks down, however good the technical quality of the work of the producer of analyses and forecasts, the work often will not be appreciated or used by the sponsor.

As I mentioned, I worked well with Admirals Sea Dog and Lawyer but never could establish a good working relationship with Admiral Diplomat. One of us had to go. Clearly, it was I, although the think tank was willing to continue the sponsorship of the work. Since I was not replaced when I left the think tank, I believe that our difficulties with Admiral Diplomat were caused by other problems as well as those of personal incompatibility — different perception of roles, different training, organizational difficulties, ethical demands. However, all of these can be mitigated or eliminated if, on a face-to-face basis, the producer and the consumer of knowledge know and trust each other.

Communication Problems

Solving the problems of communication was important to achieving what success the members of the LOS Forecasting Group could claim. We actively worked at improving the communication within our own group, between ourselves and other researchers on Law of the Sea, and between ourselves and the customers of our analyses and forecasts. Since we did make our products more usable by the care with which we discussed, wrote about, or presented our preliminary work and findings, I don't think most of our communication problems were critical.

Responsibility for the adequate flow of information both ways and a reasonable common perception of the meaning of that information rests primarily, I believe, with the researchers. First, it is in their interest to see that their needs and their work are understood by their users. Second, since poor communication often results from the lack of understanding of terms of art or technical usages, it is the responsibility of those who need to have

their modus operandi understood to make themselves understood. Third, given the pace of the decision process and the demand upon decision-makers' time, it is unrealistic to believe that they can learn much on their own about the detailed tools of the researchers' trade.

Decision-makers have three principal reasons for needing good two-way communication. First, they need to make clear to the researchers their research needs. Second, they need to understand the results provided. Third, they need to get a sense of how the analysis was done to decide whether they can rely upon the findings. Because of their need for understanding what researchers can do for them, decision-makers must make some effort to communicate with the researchers. The user must therefore involve himself to some degree in an attempt to understand the study methodology. We dealt with enough users who threw up their hands in horror at our "experimental" methods or who pleaded lack of time and who then did not understand the results to believe that it should be a 100 percent researcher, 0 percent user division of communication responsibility. But a 90 percent researcher, 10 percent user division of the responsibility for the flow of communication seems appropriate.

The task of improving communication between governmental decision-makers and a research group with different backgrounds, training, values, roles, and time constraints was difficult. The values of analysts trained in the scientific method and the values of decision-makers trained mostly in the law were often sharply different. The lawyers were verbal draftsmen experienced in bilateral bargaining who were convinced, as most negotiators are, of the importance of bargaining skill as a means of overcoming structural disadvantages. They relied upon "gut" feelings and microanalytic insights. For them experience, not research, was the key to coming up with the correct answers to bargaining questions. On the other side, while we were not unfamiliar with or unsympathetic to the need of experienced negotiators to "muddle through," our orientation as researchers was systematic and quantitative. We believed in probability, and thought bargaining decisions should be strongly influenced, but not determined, by the odds. Such different mental "sets" obviously led to some hostility and misunderstanding. Some of our users completely shut their ears to our attempts to show them what we were doing and how we believed we could help them. But, for most of our users, our attempts to show them how and why we worked led to reasonable working relationships. I doubt if we completely converted them to our point of view, but that was not our aim.

Our aim was to allow us to find out what our customers needed and then to produce results they needed in a format they could understand. Below are a number of efforts at promoting better communication that we believed helped us to our goal:

- We avoided "number-mongering." We rarely tried to make an exact numerical prediction.
- We reduced the discussion of methodology to the bare essentials. Only two circumstances required us to attempt to show our users how our methodology worked; (1) when we needed the participation of our users — e.g., for scaling our conflict issues; or (2) when we felt our users needed to know how we did what we did to judge the reliability of our results.
- We kept reports as short and untechnical as possible. Each also had an executive summary. The findings were featured in plain English with, usually, a large appendix that contained all of the figures and tables that told the story in great detail for the benefit of the limited number of users who had the need, taste, or time to peruse them.
- We tried hard to avoid the use of social-science jargon.
- We wrote out all our open briefings

in advance and rehearsed them so that we could say all that needed to be said in the minimum time and with minimum misunderstanding because of our failure to speak clearly. (This is why we could demonstrate that we did not say what others alleged we said in some briefings.)

• We relied in our open and private briefings on visual aids as much as possible. They are very useful memory crutches. When our visual aids showed statistical relationships in pictogram form, some of our users, who could not otherwise understand the relationship, "got" the idea. A specific example of this point was our use of unlabeled histograms with the ranks of the preferred positions on the X axis, and number of countries holding to the substantive position on the Y axis. We would fill in, in outline form, the distribution of all countries on the issues and then ask our users to tell us the story of what is going on in that issue — e.g., if it is strongly unimodal, obviously one preferred outcome probably is close to consensus. This promoted objectivity in viewing our results, since our users were constrained from arguing with their own, usually correct interpretations.

• We held as many private briefings as the schedules and interest level of our users permitted. As mentioned, this lowered the political costs to them. They could ask elementary questions without fear of looking foolish, and they could get the necessary information without overtly admitting they were willing to rely upon our "experimental" technique.

• We provided as many descriptive products as demanded, even though it was time-consuming for us as well as professionally unrewarding. We also answered many requests for tracing down very specific pieces of information.

But some faith, in turn, had to be shown by our users in the value of some of our more complex products. There is no easy way to explain how our packaging or maximization models worked. We tried illustrating multidimensional concepts in two-dimensional space, with no great success. In this case, we hoped that our customers would "buy" our results, because even if they could not judge how the model worked, they could judge the data that we used in the model. Recall that we deliberately transformed the data as little as possible.

In a few instances we encountered an excess of faith on the part of a user. While gratifying, it created almost as many difficulties as a lack of faith. Communicating accurately what we could not do was as important as conveying what we could do. A few of our users believed too firmly that we could solve any analytic or forecasting problem, that the computer was a miracle machine that could solve all of their problems, and that superior analytical capability gave the United States the ability to manipulate the LOS Conference at will. It was never so and we tried not to promise more than we could deliver.

But certain kinds of "communication" problems bogged our efforts throughout the history of the project. In most of these cases, we did not get our message across, not because we failed to make our meaning clear but because some of our users did not wish to receive or send the types of messages we both needed to function interactively. The messenger to Belshazzar was not killed because his message was unclear. For these classes of failure to communicate, no change in our mode or method of communication could or did solve the problem. We could do almost nothing to resolve the gap between ourselves and some of our users which resulted from personality clashes, different role interpretations, the cybernetic preference to screen out messages that established sets of responses are not prepared to accept, or where the organizational structure shaped the delivery system in such a way that the messages were garbled. If I did not suffer the true Persian messenger's fate of being dramatically removed from the system, the project was

quietly throttled, because we had no control of the dissemination of our results once they left our door. By the time we lost the right to communicate directly with the U.S. delegation via the State Department, I was too deeply involved to find, as my personal solution to the problem, the solution hit upon by Frost's bearer of evil tidings:

And that was why there were people
On one Himalayan shelf:
And the bearer of evil tidings
Decided to stay there himself.

Notes

1. As readers will soon see, I still sit athwart the fence on the question of whether governmental decision-making is a rational or cybernetic process or some as yet unarticulated combination of both. At the moment, prescriptively, I hope that government decisions can be made more rationally (that is, the best alternative outcome be chosen), descriptively I fear that what I observed was mostly a cybernetic set of responses that excluded much of the information necessary for rational decision.
2. Francis Hoole, "From Muddling Through to Modeling Through, "*Occasional Paper Number 7* Institute for Marine and Coastal Studies, University of Southern California (Los Angeles: June 1978).
3. Joseph B. Kadane, "On Division of the Question," *Public Choice* XIII (Fall 1972), p. 47.
4. Oran R. Young, *Bargaining: Formal Theories of Negotiation* (Urbana: University of Chicago Press, 1975), p. 13. Oran Young describes this as the "sequence in the form of he thinks, I think, he thinks, I think, and so forth."
5. A short technical explanation of the models is available. Those interested should request a copy from the author.
6. "The Sharks of Geneva," *Washington Post* May 11, 1975, p. C4.
7. *Report of the Honorable John M. Murphy, Chairman Oceanographic Subcommittee to the House Merchant Marine and Fisheries Committee on his Participation in the Law of the Sea Conference, May 2, 1975.*
8. Robert Axelrod, *Conflict of Interest* (Chicago: Markham, 1970), pp. 6-7.
9. William J. Durch, "Information Processing and Outcome Forecasting for Multilateral Negotiations: Testing One Approach," a paper prepared for presentation to the 18th Annual Convention of the International Studies Association, March 16-20, 1977.
10. If the process was cybernetic, then perhaps my complaints in the previous paragraphs about lack of adequate organization to support the use of rational decision tools should be dismissed. It could be argued that the organization of the Task Force was exactly what an observer should have expected from a decision body whose process was cybernetic.
11. John D. Steinbruner, *The Cybernetic Theory of Decision* (Princeton: Princeton University Press, 1974), pp. 65-71.

Discussion

Robert E. Crew, Jr.
Woodrow Wilson School, Princeton University

I would like to comment not just on the individual papers that we've just heard but on the kinds of themes regarding the decision-making process that have been discussed throughout the conference. I'm not an expert in marine policy. I'd be hard-pressed to talk about the history of the decision-making process in this area. However, I'd like to comment about several aspects of the marine policy-making process which were discussed both today and in the previous two days.

I discovered when listening over the last couple of days that there are three strands of thought about the decision-making process in the marine policy area. The first of these was — I may be overstating it a little bit — that the non-social science, nonsystematic, so-called political decision-making process used by legislators, bureaucrats, and other people, elected and appointed officials in the marine policy area, is less rational than the type of systematic data gathering, hard-science analysis that we've talked about, that a lot of people have talked about here. The idea is that we need more of this. We need more systematic data, we need better techniques to analyze it — better in the sense of more formal models. That's one strand.

The second strand is that there are certain structural and decision-making institutions or arrangements that are better than others. Throughout the conference, today and earlier, we have heard references to centralized systems, to unified data collection efforts, and to integrated analysis techniques. The implication that I got from those comments is that centralized, unified, and integrated systems are "better" systems; that integrated analysis is a better way to analyze the public policy process than whatever the alternative is. I get the impression that the alternative is a political process, decentralized — a lot of negotiations, trade-offs between individual states and individual policy-makers within a particular bureaucracy.

And then the third thing that came across to me is that the costs of doing things in this unsystematic, decentralized, unintegrated, and uncoordinated fashion are high. A definition of high was not given, but the implication is that we have got to do it some other way because this way is costing us a lot.

It seems to me that there are some real problems in looking at the policy-making process in just these terms. First of all, it is somewhat misleading to argue that the rationality in the political decision-making process is less than in the more formalized social science, organized process. It *is* rational for elected officials to want to get reelected. It *is* rational for bureaucrats to want to protect their positions or to argue that what they want to do in the policy-making process is better than what others want to do. Indeed, people who are trying to implement ocean policy, I think, should include these so-called non-rational calculations in any decision-making process.

The second problem is that even if we conclude that the social science model is more rational or logical, we shouldn't necessarily think that it is, therefore, more correct. Most of us who have dealt with social science know that there are enough examples of just plain wrong social science, using the best available techniques, to make us all a little reluctant to rely solely on that kind of analysis. Being a social scientist and having also had some administrative responsibilities in the past, I'd certainly be reluctant to rely on that model exclusively.

My suggestion, then, is that we are going to have to do several things. We need to continue the attempts which have been discussed at this conference to improve our data collection, our analysis, the kind of process which is called "rational." I think, though, that we need to include explicitly the kinds of political concerns that haven't been discussed very much here. That is, we need to gather data about the beliefs of decision-makers, their personal feelings, in the same systematic way that we need to gather other kinds of more hard data. I think we need to do this for two reasons. First of all, it's valuable in a tactical sense. Frank Hoole said something yesterday which I found to be true in my experience. That is, without the understanding of the political decision-makers and the acceptance by them of the kind of data that we are using, they simply aren't going to use whatever it is that we are developing. So it is, in a tactical sense, useful to us who are concerned about the decision process explicitly to include them and their feelings and their biases in some fashion into the calculations.

The second reason that I think we ought to do this is that a lot of the information is valuable. In many cases, it's just as informative, just as useful, as a lot of the harder social science data. Political instincts, for example, of mature, political, elected officials, in my experience, have been just as good in terms of predicting things as some of the social science techniques that we have utilized. So I think we lose, not only a tactical consideration, by not considering those factors, but we also lose in our development of knowledge. Elected officials, for whatever reasons — we can't explain it — who have been around a long time simply have a feel for what may happen in the future, how people are going to behave. We need to take advantage of that.

We need to do a second thing which social scientists can probably do more efficiently than other people. We need to develop and test different kinds of structural and decision-making models. Is a decentralized process better than a centralized process? We've heard some assertions here that it is. We've heard, at least I've heard, arguments that we need to move toward more centralized kinds of systems. I heard those same arguments in another policy area. Those are simply assertions as far as I can tell. I've seen no data. I've seen no experiments looking at the differential impacts, so I think that we need to do that in an explicit fashion, and that's pretty tough. It's going to be tough to go to Congress or to other decision-making agencies and say, "Well, look, we don't really know very much about this. Why don't we give some money under a centralized system and another one under a decentralized system and test out the different effects?" There are all kinds of political problems and ethical problems in doing that, but unless we do that we simply aren't going to be able to answer some of the questions that we've raised, such as: Are the costs too high? We don't know that the costs are too high. We don't know what the costs are of doing it in an alternative fashion, because we have never done any kind of explicit comparative analysis. Unless we prove our skills in the analysis of the political aspects of decision-making, unless we test these kinds of explicit differences in the decision-making process, we are not going to be able to say very much about how marine policy ought to be formulated.

Charles Cnudde
Political Science, Michigan State University

Rational decision-making is un-American. It is un-English. It is French. That is a paraphrase of Mark Twain; I am applying it to the situation that we have been discussing today, the formulation of marine policy. It fits very nicely, because what we have been talking about or alluding to as rational decision-making is an idealized view of decision-making. By the way, in this context I would put the word "rational" in quotes, in order to distinguish it from what Mr. Crew was talking about when he used the word "rational" in his very perceptive critique. The papers we have heard this morning compared the kind of decision-making we ordinarily find in the United States to a logical ideal. In comparison with that ideal, the papers found decision-making in marine policy especially wanting.

What we usually find in United States decision-making is a pattern we call "muddling through" or some such term.[1] The structure of the arguments in the papers so far today was to find fault with what we usually have in U.S. decision-making and to advise agencies in the marine field to move closer to the rational ideal. For example, let us look at Professor Armstrong's paper. He found difficulties with the fragmentation of single-purpose programs that exist in marine policy. Fragmentation, as we will see, ultimately leads us to the incremental, or the "muddling through," style of decision-making.[2] Another example is Professor Friedheim's paper. He dealt with the very complex situation of decision-making in which he as a researcher was a participant in the activity. His research tried to provide some of the actors in that decision-making situation with the ability to forecast future events. His goal was to increase, presumably, the rationality with which they would take positions in international marine negotiations, given the probable future status of the system.

Garry Brewer's paper is a third example. He was talking about what looks like a life cycle — I do not know whether it is a natural history kind of life cycle — but a life cycle of stages in the policy process. He found some difficulty with the fact that one of those stages that he would argue for on logical grounds frequently does not exist in ocean policy decision-making. That missing stage is the estimation stage, if I understand correctly what Mr. Brewer was saying. On the other hand, this stage clearly would be present if we had rational decision-making., Consequently, he advises us to consider more carefully what we need to do to include this stage and thereby increase the quality of our decisions.

In each of these cases, I think, what we are doing essentially is following the same logical structure. The logic of it is to posit a type of theoretical ideal and to use that in order to make criticisms of reality. Now, I am interested also in that kind of logic, in that I am interested in beginning with a theory, but I would approach it differently. I guess the approach that I would take would be to go back and lay out in a better way what the theory is that underlies what we understand as "muddling through" and then compare that theory with some of the suggestions of our speakers. This comparison would then allow us to evaluate their advice on how we could do better. In other words, my goal is to gain some leverage on our ability to judge whether the improvements suggested by the previous papers would have the desired effect. We can get some leverage on that by looking at the logic of the underlying theory of decision-making.

What we think of as "muddling through" in the decision-making literature is a logic that has not been completely laid out yet. A number of distinguished authors have dealt with incrementalism in the literature, but the

theory has not been laid out in a very systematic fashion.

I am not going to attempt to lay it out for you today in a formal manner, because that task has only begun and moreover, it would be of interest only to the political scientists in the audience. But there are some key elements of that logic, of that theory, that are quite applicable, and I think they can give us some leverage in treating the papers that were given today. The logic indicates that one of the driving forces underlying incrementalism appears to be divided authority. The previous papers today have also used the terms "jurisdictional disputes" and "fragmented decision-making structures." What we mean by each of these terms is the same thing: an absence of unity of command.[3] One of the reasons that we do not have unity of command is that we have divisions of labor among agencies.[4] This structure requires compromise or consensus-building among political actors before a decision can be made.[5] Compromises among agencies with conflicting interests can be constructed through decisions based upon "successive limited comparisons"[6] or by "continually building out" policy from the current position "step by step and by small degrees."[7] Thus, although the literature does not stress it, agreement is possible at the margins even when abstract values would be in conflict.

If the need for compromise leads to incrementalism, why do we find the results so unsatisfying? As Herbert Simon has taught us:

> In an important sense, all decision is a matter of compromise. The alternative that is finally selected never permits a complete or perfect achievement of objectives, but is merely the best solution that is available under the circumstances. The environmental situation inevitably limits the alternatives that are available, and hence sets a maximum to the level of attainment of purpose that is possible.[8]

In short, the need for compromise leads to the suboptimal or less than ideal outcomes that would occur under a rational unity of command model. We term the less than rational ideal an "incremental" solution. Thus, divided authority gives us "muddling through" as a decision-making structure. "Muddling through" is the kind of thing that has been raised throughout this conference whenever anyone spoke about decision-making in the marine policy area.

So clearly what this means is that what we have here is a theoretical structure which fits very nicely the policy field we are dealing with. Divided authority is the thing that appears to drive this theory and it appears to fit the substance of what we are talking about: the overlapping jurisdictional boundaries of the decision-making agencies in the ocean policy arena.

Another element in the theory that joins with divided authority is complexity. Bureaucracies deal with complex subject matter by organizing it into more or less hierarchical systems.[9] These "nearly decomposable" systems are not unrelated to compromise as they limit or constrain options for decision.

> The set of constraints emerges from a mix of expectations and demands of other organizations in the government, statutory authority, demands from citizens and special interest groups, and bargaining within the organization. These constraints represent a quasi-resolution of conflict — the constraints are relatively stable, so there is some resolution.[10]

One result, then, is that bureaucracies combat the uncertainities brought on by complex subject matter through stable divisions of labor.[11] These divisions of labor, in turn, have the noted effect of suboptimization.

Clearly, complexity also applies to the ocean policy subject matter, given the mix of international, technological, and economic issues in this field.

If we can agree that the elements of the theory fit the subject matter, then we can go back to the papers to make an estimate of whether the suggestions offered would be effective, given these key elements of divided authority and complexity. For example, perhaps we could move closer to the rational ideal by increasing the information that decision-makers have by forecasting future options, as in Friedheim's paper. The question then is: Will that deal with the problem if we do not also address the difficulty of, say,

divided authority? If divided authority is an ultimate factor that brings about a less than ideal decision outcome, how are we going to improve upon decision-making if we do not address this basic driving force — the divided authority circumstance?

The constitutional reality of separation of powers and federalism are factors that are central to the United States. Given our constitutional structure, therefore, we start out with divided authority. In addition, we have issues involving international and rational actors. As a result, we have a very peculiar and extreme form of divided authority in the marine policy field. Professor Friedheim feels that his analysis was not used by decision-makers because of personality conflicts or because the "tidings were bad." Were these the real reasons, or was it because divided authority exists and the analysis did not address that?

I really do not know. The theory would indicate, as it has been developed in the literature, that the issue of divided authority has to be addressed if we are going to deal with this kind of "muddling through" decision-making.

Garry Brewer says that the estimation stage is not fulfilled. Well, yes, that is right, because we have set the stage in the United States for the "muddling through" process. We have decision-making under less than ideal conditions. Because we have less than ideal decision-making conditions, we do not do a good job at getting all of the data we need, including the estimates assumed by the rational ideal. Why do we not have this ideal? Because we have complexity overlaid by divided authority.

So, if you say as Professor Brewer says, we skip the estimation process, in terms of the logic of the theory, what you are telling me is that, yes, we have "muddling through." Well, the problem is that if "muddling through" has the problem that we think it has, then we have to do something about that. Professor Brewer is not telling us much about what we should do to improve on our decision-making.

John Armstrong, on the other hand, in his paper, was alluding to some possible ways of dealing with the divided authority mechanism. He noted that one solution was centralization. But he was saying, I think correctly, that centralization will not always work. This is where the theory needs a greater development. If divided authority is a basis for suboptimization, centralization may move us to a more optimal outcome. However, we do not know the conditions under which centralization will move us closer to the more idealized decision-making that our panel is interested in. That is, we do not know to what extent centralization among, say, middle-level agencies will overcome the divided authority inherent in the American political system. That is to say, we do not know the conditions under which movements away from divided authority will decrease incrementalism. Moreover, we have not very well calibrated the extent to which divided authority relates to the supposedly inefficient decision-making process that we have. We do not study it in these terms, so we have a great deal of difficulty knowing how much centralization will produce so much efficiency. (What I have in mind here are studies such as those Davis, Dempster, and Wildavsky have carried on in the budgetary field.[12]) I would think that in order to do better in guiding policy, that is one of the things we would have to know about. We would also have to know about the conditions under which we could get decentralization producing increased efficiency.

So these are areas where the theory is weak. First of all, the theory is not very well worked out formally. Secondly, once it is laid out in terms of variables, such as divided authority and complexity on one hand and optimal outcomes on the other, as I have tried to do here, we need to specify the conditions under which one type of relationship may be expected rather than another. I think in order to guide policy, if that is our goal — and I think it should be our goal — we need greater theoretical development in this area so that we may come to the point where guidance is possible.

So, ultimately, the way I see it is that,

given the nature of the United States constitutional system, we have already structured things so that we are going to have something less than the ideal that everyone has been talking about in the conference. It seems to me that most of what else we do about changing our decision-making structure will be working at the margins. In some cases, working at the margins will be important. It might be worthwhile. But to think that we are going to approach this ideal and solve all of our problems, given the nature of the U.S. system, I think, is quite questionable. We are not French, our Constitution is not French, and so some "muddling through" is to be expected.

Notes

1. Charles E. Lindblom, "The Science of Muddling Through," *Public Administration Review* 19 (1959): 79-88.
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3. Luther Gulick and L. Urwick, eds., *Papers on the Science of Administration* (New York: Augustus M. Kelley, 1937).
4. Graham T. Allison, "Conceptual Models and the Cuban Missile Crisis," *American Political Science Review* 63 (1969): 701-6.
5. Amitai Etzioni, "Mixed-Scanning: A 'Third' Approach to Decision-Making," *Public Administration Review* 27 (1967): 385-92.
6. Charles E. Lindblom, p. 81.
7. *Ibid.*
8. Herbert A. Simon, *Administrative Behavior* (New York: Wiley, 1945).
9. Herbert A. Simon, "The Architecture of Complexity," in *The Sciences of the Artificial* (Cambridge, Mass.: M.I.T. Press, 1968).
10. Graham T. Allison, p. 700.
11. Richard M. Cyert and James G. March, *A Behavioral Theory of the Firm* (Englewood Cliffs, N.J.: Prentice-Hall, 1963); John D. Steinbrunner, *The Cybernetic Theory of Decision Making* (Princeton: Princeton University Press, 1974).
12. Otto A. Davis, M. A. H. Dempster, and Aaron Wildavsky, "A Theory of the Budgetary Process," *The American Political Science Review* 60 (1966): 529-47.

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It seems that this conference is all about ocean management and whether ocean management should be centralized or decentralized. But to a certain extent, whether we like it or not, the train's already out of the station. We've got an Office of Ocean Management in Washington, which is "muddling through," and if we were to talk to the players in the Office of Ocean Management, who are now using the marine sanctuaries program as a lever toward some sort of management scheme, the impression we would get is that they favor a centralized approach largely done through a bureaucracy called NOAA.

There is a certain kind of nervousness about how much time we really have to develop a conceptual framework for ocean management. I can envision the possibility of John Armstrong's study providing the intellectual base for next year's conference. In fact, it may be the only work done on ocean management between now and next year.

Now, I have great admiration for John and his colleagues, but I think the problem of ocean management is difficult and it is probably going to require a great deal more study. The point I'm trying to make is that we don't really have a firm intellectual base for ocean management. If we did have such a base, we wouldn't all be saying, "What does he mean by that?" and, "What's this and what's that?" and we wouldn't have had the kinds of questions that have come up throughout the conference. Essentially, what we know about ocean management is that we don't know what in the hell we are talking about

when we talk about ocean management. And until we begin to know what we are talking about, we are going to be "muddling through." Therefore, I think Mr. Brewer's framework is rather nice.

Now, if you want a more centralized system, you can talk about organizational components such as a Department of the Oceans. I hate to play for realities, but that's unlikely. I know we all care for the oceans deeply.

However, there are other national problems, and actually, it's my impression, particularly since I work for a political body, that the oceans get pretty fair play, perhaps more than they deserve in the entire political process. They have a lot of support on Capitol Hill, even though there are a lot of national problems. Politicians have to carry two or three hundred issues around in their heads at all times, and if we think that the oceans are being ignored, we of the ocean community should ask how badly off we are compared to other issues.

The other part of the ocean management question that really concerns me is that ocean management is really a concept that was born in Washington. Somebody was sitting around one day and said, "Yeah, we've got all these multiple-use conflicts out there, you know the fisherman, the oil rigs, and the oil men are running into this, and it may get worse." So all of a sudden a concept was born, and we had to have conflict resolution and some sort of centralized authority to do it. I still think that the question remains moot whether we need it or not, and that's where the researchers could be helping focus the discussion, as John said.

There is also the possibility that, because ocean management is a concept born in Washington, during this period of gestation the turf battles with other organizations may get severe — for example, NOAA fighting with the Interior, the Coast Guard, and so forth. In fact, we may come up with research information that says, "Hey, we need some sort of an ocean management system," but by that time the framework into which we can lay it won't be there, because the battles over ocean management and who should control what will have been so acute that nobody will listen to the information that you bring in.

I think we have got to be very, very cautious and start working very hard to define what we mean by ocean management in order to get some sort of an agreement on it and be very realistic about the political and administrative process into which we are placing it.